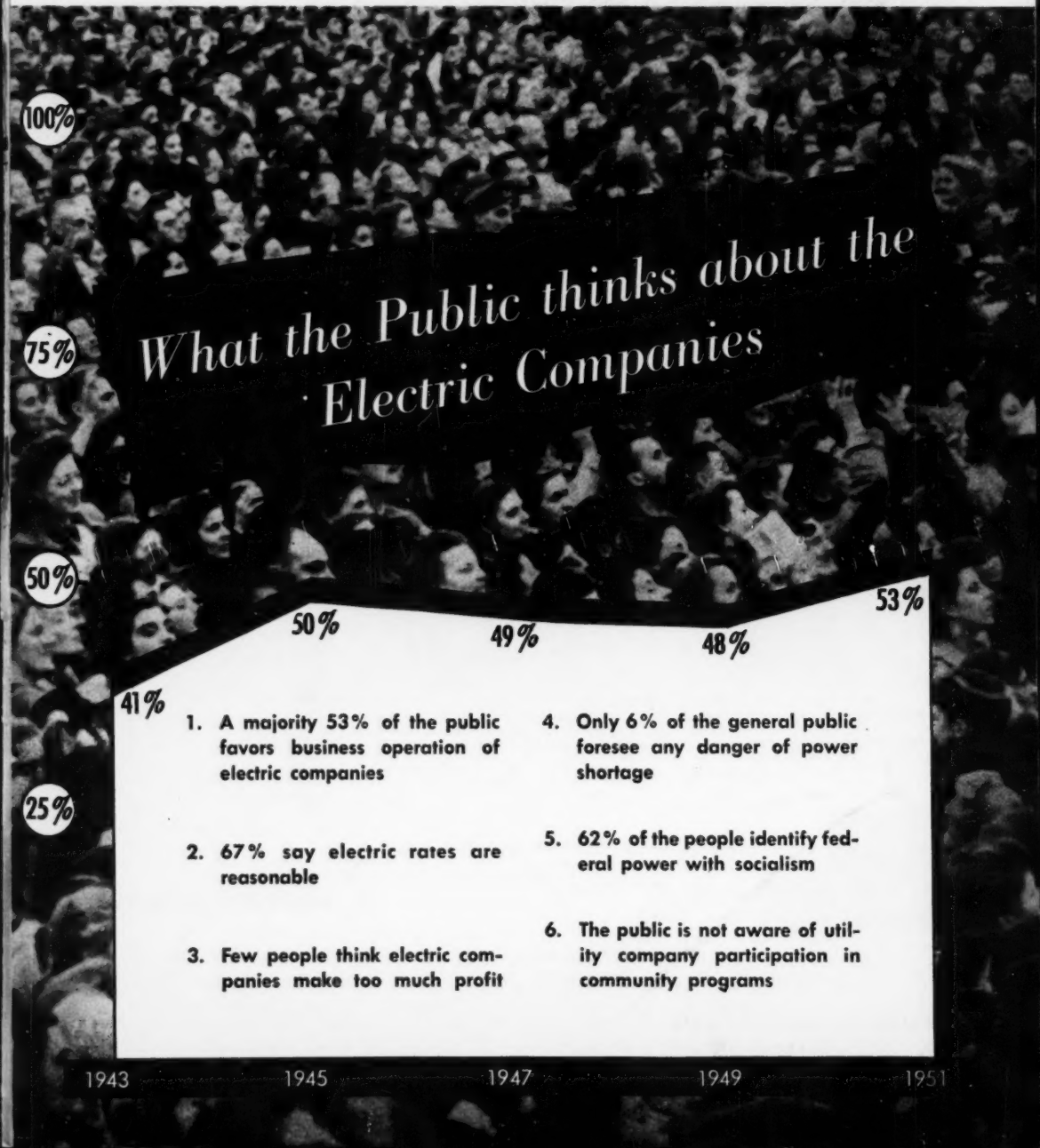
JUNE 4, 1951

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION


100%
75%
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25%
What the Public thinks about the Electric Companies
41%
50%
49%
48%
53%
1. A majority 53% of the public favors business operation of electric companies
2. 67% say electric rates are reasonable
3. Few people think electric companies make too much profit
4. Only 6% of the general public foresee any danger of power shortage
5. 62% of the people identify federal power with socialism
6. The public is not aware of utility company participation in community programs
1943
1945
1947
1949
1951

The Murray METER SOCKET

will save you money because it is fully *Adaptable*

HERE'S HOW IT WORKS... Minor on-the-job adjustments convert the Murray Meter Socket

1

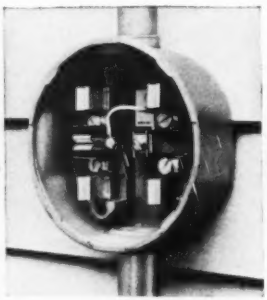
Here is the Murray Meter Socket with jaws in a vertical position. To make conversions, simply remove mounting blocks by taking two screws, top and bottom, out of each.

2

Conversions are quickly and easily made at the back of each block. The jaws may be turned to a horizontal position. With the jaws in a vertical or horizontal position, the solderless connectors can be swung out into the gutter for bussing.

3

This picture shows the jaws in a horizontal position, the solderless connectors swung out. Note the *depth* of the socket and the sturdiness of its one piece steel construction.



4

Some applications in the field require the use of a fifth jaw. Such a fifth jaw is available with the Murray Meter Socket.

The Murray Meter Socket is quickly and easily adaptable to a variety of situations met in the field. A minor adjustment converts the socket on the job to the type required. This versatility can save power companies money every day. With the Murray Meter Socket there is no need to stock and carry a number of different types to the job. The Murray Meter Socket is all types in one.

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INTERLOCKED SEAM ANCHORS HUBS TO SOCKET

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Service Entrance & Meter Equipment · Magnetic Circuit Breakers · Switches
Current Limiting Reactors · Crows'nest Aerial Ladders

IN THIS ISSUE

One of the most common problems facing every utility operating in a city of any size is how best to serve the "fringe" area. This is the area which fringes on the downtown underground network—where you're likely to find a good many blocks requiring ordinary residential or small commercial service, then a big hotel or industry demanding a heavy load.

Georgia Power has found some workable answers to the problems of the fringe in Atlanta, and they are clearly set forth in this issue by R. O. Loomis, an engineer who specializes in troublesome puzzles, and P. B. Boyd, who specializes in underground. They are a writing team already familiar to many Electrical World readers who have read their past contributions.

TRAVELING MAN

"Homekeeping youth have ever homely wits; . . . I rather would entreat thy company, to see the wonders of the world abroad, than, living dully sluggardized at home, wear out thy youth with shapeless idleness."

This bit, from **Two Gentlemen of Verona,** is the favorite quotation of Joe Robinson, Electrical World's west coast editor who sent us the report on the world's largest submarine cable in this issue.

Joe travels both on his job and as his chief hobby, and covers so much territory that he finds little time for "homekeeping." When he **is** at home, he's in an apartment on San Francisco's Telegraph Hill.

His beat is chiefly the Coast from Canada to Mexico, but he's also responsible for industry news in all of the eleven western states. His total assignment covers 1,189,140 square miles. If you want an idea of the distances involved, lay a ruler on a map of the U. S. You'll see that it's considerably farther from the Northwestern to the Southeastern corners of California than it is from New York to Chicago.

Concerning his chief hobby, which is traveling, Joe says: "I'm proud to say that I've met on their home grounds the executives and working people of every major electric utility in the West, and I hope someday to be the best-informed dad-gummed reporter of our industry who ever crossed the Mississippi."

THE EDITORS

Electrical World

Published for 77 years for those engaged in the business of generating, transmitting, distributing or applying electric power

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Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. **Publication Office, 99-129 North Broadway, Albany 1, N. Y. Executive, Editorial and Advertising Office: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y.** Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

Subscriptions: Address correspondence to Electrical World—Subscription Service. 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address.

Please indicate position and company connection on all subscription orders.

Single copies 35¢. For the United States and possessions $6 a year, $9 for two years. Canada, $7 for one year, $11 for two years, $14 for three years. (Canadian money, at par.) Pan-American countries, $15 for one year, $25 for two years, $30 for three years. All other countries $20 for one year, $30 for two years, $40 for three years. Entered as second class matter, November 16, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in USA. Copyright 1951, by McGraw-Hill Publishing Company, Inc. Permission required to reproduce any of contents.

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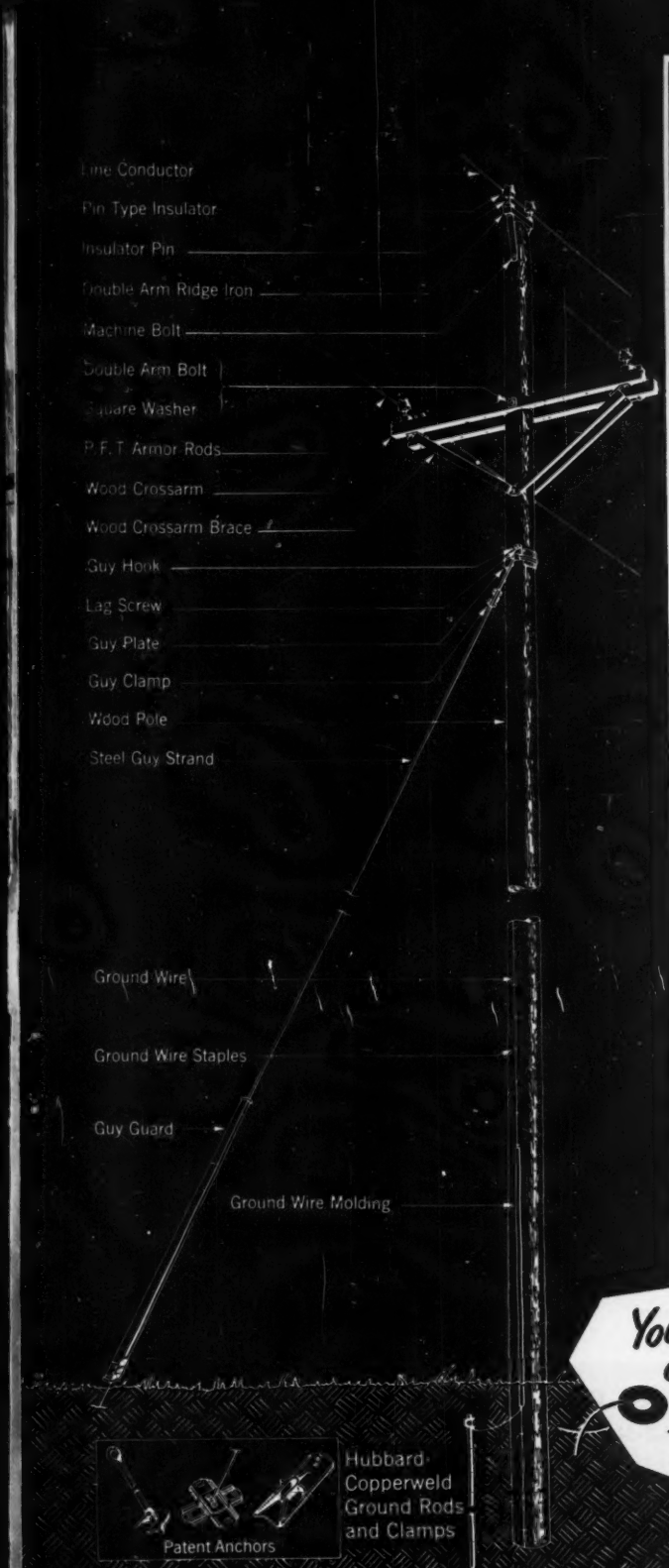

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everything from the bottom of the hole to the top of the pole

Why spend time shopping around for pole-line equipment and supplies? From near-by Graybar you can fill all your requirements with just one order—and be sure you're getting dependable items. By ordering all your pole-line needs from this single source, you save time and paper-work expense. You get the products of the leading manufacturers of poles, crossarms, insulators, hardware, strand, line trucks and tools.

As conditions permit, Graybar stocks many pole-line items in local warehouses in more than one hundred cities. By scheduling ahead with Graybar, you're sure of the best possible chance of having all your requirements filled and on the job site when needed.

When you call on Graybar, for supplies or for information, your needs are understood and accurately met. That's because Graybar has been familiar with pole-line requirements ever since the first lines went up. Experienced Graybar Outside Construction Specialists are on call to help you solve unusual problems in the planning of any pole-line or underground project. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.*

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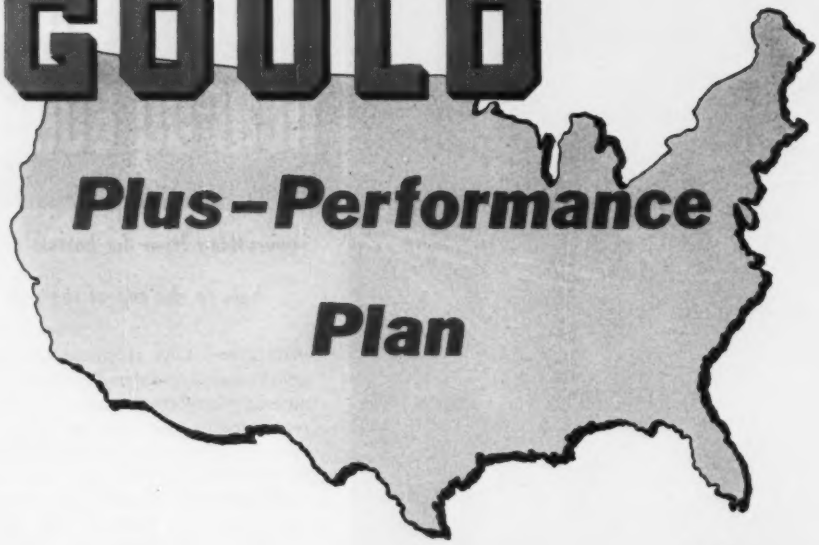

More Timely Than Ever!

With the issuance of NPA Lead Conservation Order M-38, Gould's newly announced PLUS-PERFORMANCE PLAN is exactly what you need now to conserve and extend your essential battery power! In fact, you can improve battery performance as much as 50% if you use this plan to help you (1) buy batteries to fit the job; (2) charge and handle them properly; (3) maintain them systematically; and (4) know their condition at all times.

The GOULD PLUS-PERFORMANCE PLAN is a complete conservation program based on charts, record cards, bulletins, specifications and articles explaining and illustrating how to get more production and greater performance from your storage battery equipment.

LET THIS PLAN GO TO WORK FOR YOU

Write Today!

All this material is yours—free and without obligation. A request on your letterhead for information on any battery problem will bring by return mail appropriate literature and booklet explaining the complete plan. Write us, attention Field Engineering Department.

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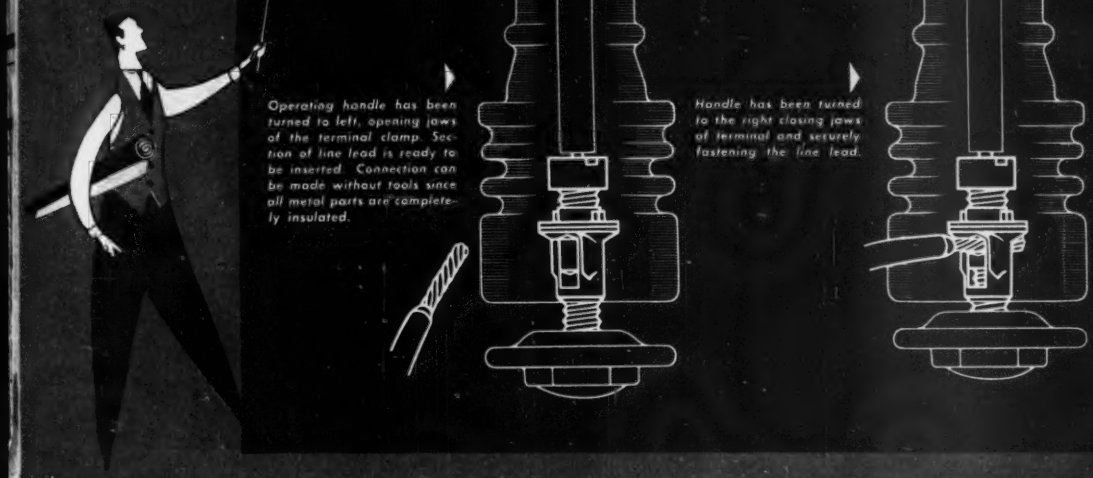
Always Use Gould-National Automobile and Truck Batteries

IT'S A FACT:

KUHLMAN QUICK-GRIP... MOST COPIED TRANSFORMER BUSHING... BECAUSE IT SIMPLIFIES LINE CONNECTION JOB!


Operating handle has been turned to left, opening jaws of the terminal clamp. Section of line lead is ready to be inserted. Connection can be made without tools since all metal parts are completely insulated.
Handle has been turned to the right closing jaws of terminal and securely fastening the line lead.

Here's the bushing terminal that is rapidly becoming the choice of transformer buyers all over the country . . . the Kuhlman "Quick-Grip!" Specified by utility engineers everywhere, many other transformer manufacturers have copied its design features.

Ask any lineman what he thinks of the Kuhlman "Quick-Grip." Let him tell you how it eases and speeds his job of making line connections by eliminating use of tools. All he does is insert the lead into the hole in the side of the bushing and secure the connection by simply turning the handle on the end of the terminal. That's all there is to it! The clamp accommodates full range of wire sizes prescribed by EEI-NEMA Standards; mounting hardware is inside the tank protected from corrosive effect of the atmosphere.

The "Quick-Grip" is favored too, because of its safety features. Heavy insulating knob prevents accidental contact with live parts. Lead enters through side of bushing eliminating necessity of gripping over the lead when making connections as in the case of a rotating chuck type terminal. Since there is only one entry hole for the lead, its sharp point cannot protrude on the opposite side of the bushing to be a hazard to the lineman.

Write today for full details on the Kuhlman "Quick-Grip" bushing . . . it is available on all Kuhlman transformers 5KV and below where sidewall high voltage bushings are standard.

Kuhlman ELECTRIC COMPANY, BAY CITY, MICHIGAN

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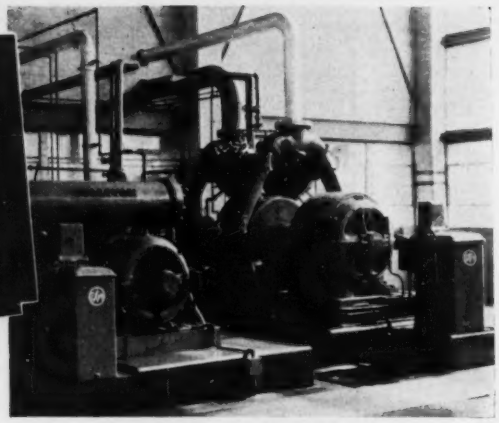
A BIG AID TO PRODUCTION
OIL-IMMERSED FOR LOW MAINTENANCE



Air Compressor Installation

Compensator mechanism

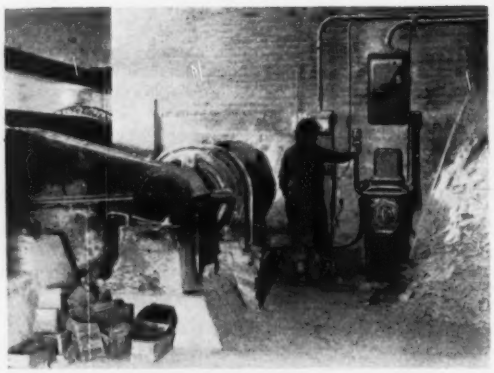
Complete compensator

For Grain Processing Machines

Many industrial plants rely on EC&M auto-transformer 220-550 volt Motor Starters for continuity of production. Oil-immersed, these starters are always well lubricated and protected from corrosion — *the need for frequent inspection or maintenance is eliminated.* Motor circuits are made and broken under oil—thoroughly safe, no dust hazards.

The compensator mechanism uses a simple, double-throw contactor requiring only one magnet coil—transition from reduced voltage starting to full voltage running is *automatic.* Squirrel-cage or synchronous motors are brought up to speed quickly, safely—with greater skill than human hands could do it.

Overload relays give inverse-time-element protection and also *trip instantly* on heavy over-currents. A magnetic balance in each relay absorbs heavy starting currents and allows a *low* current setting for accurate protection under running conditions.



Grinding Mill Installation

Write for Bulletin 1045 and No. 19 ACCELERATOR Bulletin

THE ELECTRIC CONTROLLER & MFG. CO.
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Where 3-Phase Loads are a Factor

install the Big KEARNEY

3-PHASE OIL CIRCUIT RECLOSER

For Complete Protection
With Minimum Maintenance

This sturdy, compact unit consists of three single phase reclosers mechanically linked together so that a sustained fault on any phase automatically causes all three to lock out on the fourth operation

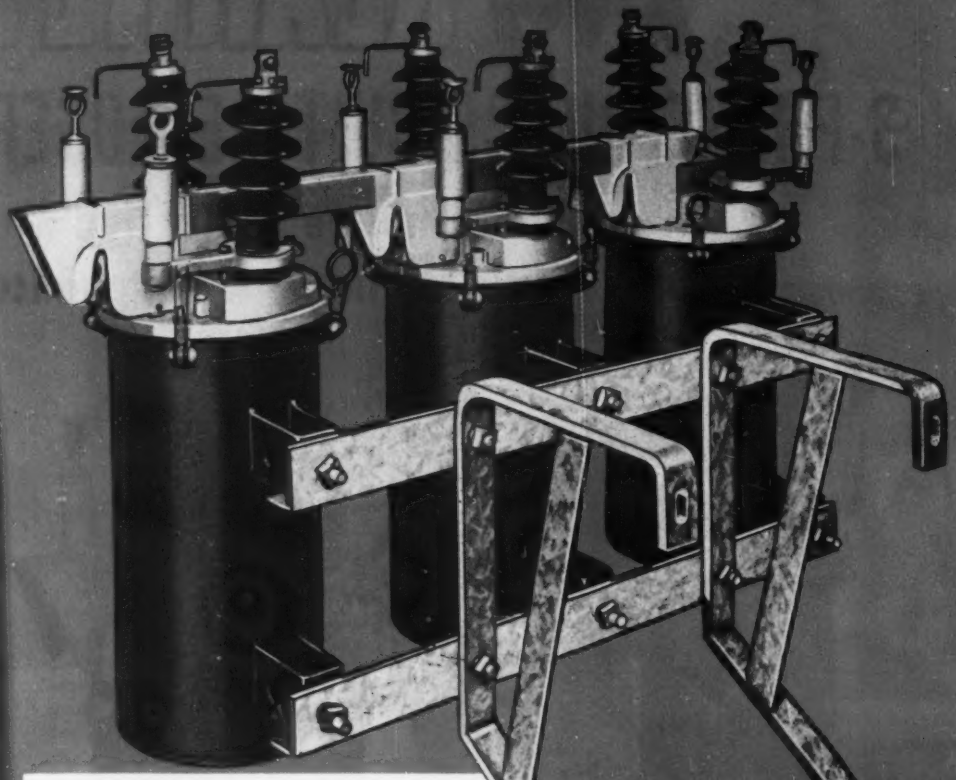
JAMES R. KEARNEY CORPORATION
ST. LOUIS, MO.

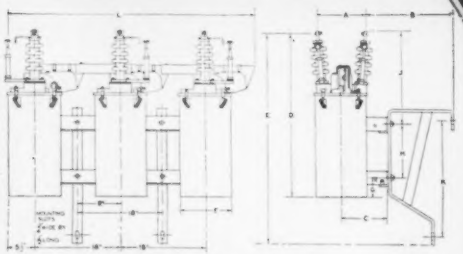
JAMES R. KEARNEY CORPORATION 4224-42 Clayton Ave., St. Louis 10, Missouri

Canadian Plant: Guelph, Ontario

SEE FOLLOWING PAGES FOR DETAILED INFORMATION

Eliminate "Single Phasing"—





DIMENSION OF TANKS AND MOUNTING RACK.

	A	B	C	D	E	F	G	H	I	J	K
15 KV	10½	18¾	9¾	34	44	11	4	11¼	18¼	24	53
25 KV	10⅛	18⅜	9¾	38½	48½	11	6½	11¼	20¼	24	53

DIMENSIONS (INCHES)

JAMES R. KEARNEY CORPORATION

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue
St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

SPECIFY KEARNEY PRODUCTS...

PREVENT DAMAGING 3-PHASE MOTORS

with the KEARNEY 3-PHASE Oil Circuit Recloser

Incorporating all of the advanced design features (see below) of the single phase unit, the three-phase recloser is especially designed for use on rural three-phase distribution lines or in outlying substations.

HOW IT WORKS

Operation of the three-phase unit is identical with that of the single phase except that a permanent fault on any phase causes the other two to lock out. Reclosing and resetting occur independently on each phase. If the fault clears after one, two or three reclosures, the unit affected resets for normal operation with no interruption of three-phase service. On the fourth operation, the mechanism locks out all three phases and remains locked out until manually reclosed. When the sustained fault is cleared all three reclosers are reclosed manually by the simple operation of pushing one pull ring up into the protective hood.

Because of the rugged construction of the linkage under the protective hood, it is impossible for weather to affect its operation. Even the most severe icing condition will not bind any of the moving parts.

SEPARATE TANKS

The advantages of separate oil tanks are threefold: (1) Because each recloser section is immersed in a separate tank of oil, the possibility of inter-phase faulting is eliminated; (2) The cylindrical shape of the individual tank minimizes internal pressure; (3) Maintenance costs are also reduced because if repair work is necessary the work is confined to the faulted phase eliminating the necessity of removal or replacement of the big common oil tank.

Here Are Some of the Advanced Design Features

that Assure Better Protection:

when you install the Kearney Automatic OIL CIRCUIT RECLOSER

1. Steel Tank is Bonderized and painted with three coats of Baked Enamel.

2. Operating handle is dead and independent of internal mechanisms. Moves only on lockout and cannot be held closed against fault.

3. Operation Counter is placed at an angle so it may be read easily from a position below the recloser.

4. Recloser may be removed from tank and replaced with a recloser of another rating.

5. On sustained faults, recloser will open four times and lock out whether the value of current is minimum tripping or maximum interrupting.

6. The sequence of opening speeds will be in accordance with the setting. The open time interval between reclosures is 1.5 seconds.

7. If fault is cleared from line on the first operation, the recloser will, upon reclosing, reset in 30 seconds.

8. If fault is of such duration that recloser opens less than four times in succession, it will reset for four additional operations.

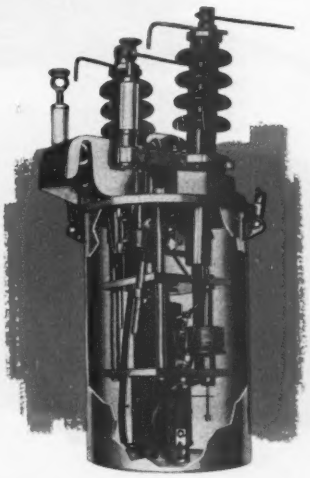
9. Opening time and reclosing time is controlled by a mechanical escapement which is not affected by viscosity of oil or temperature changes.

10. The various sequences of opening speeds make possible coordination with fuses and other reclosers.

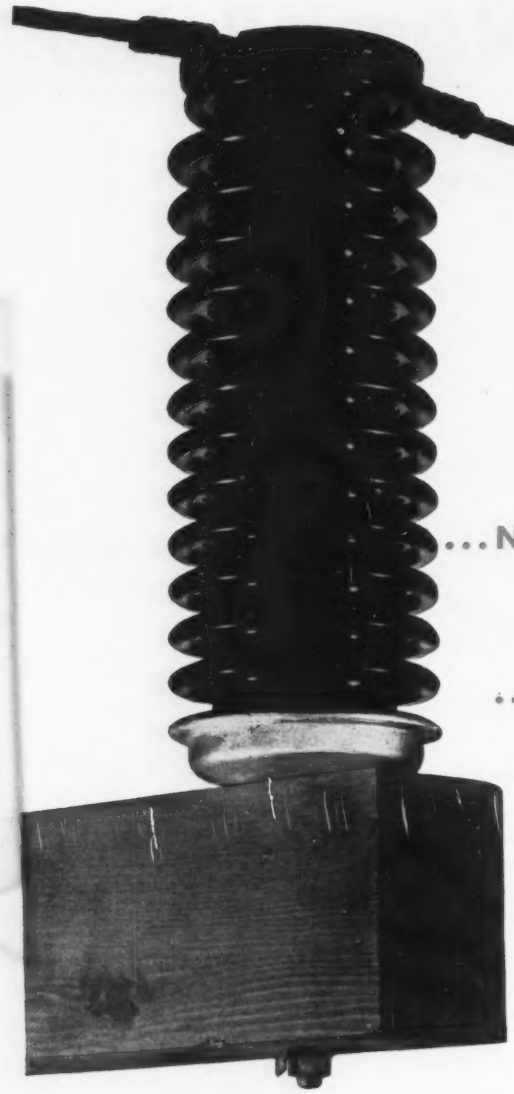
11. Impulse withstand test voltage to ground 110,000 volts.

12. Coils are protected from surge voltages by an internal spill gap.

Operating characteristics on the Kearney OCR are available on request—specify rating in which you are interested.



Better Construction – *SAFER* Maintenance



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...NO RADIO INTERFERENCE

...NO CRACKING ...NO PUNCTURE

...GREATER RESISTANCE TO

...BETTER PERFORMANCE UNDER

...LOWEST REPLACEMENT AND

ISN'T IT TIME FOR YOU

20 YEARS,,

...NO CLEANING

STONES AND BULLETS

ARCOVER

MAINTENANCE COST

TO STANDARDIZE ON LAPP LINE POSTS?

Lapp

LAPP INSULATOR CO., INC., LE ROY, N.Y., U.S.A.

Southern California Edison Stabilizes Transmission System

With Allis-Chalmers Hydrogen-Cooled Synchronous Condenser

THIS 40,000/16,800 KVA HYDROGEN-COOLED SYNCHRONOUS CONDENSER supplies reactive kva to regulate voltage and stabilize the far-flung transmission lines of Southern California Edison. It is one of several similar Allis-Chalmers machines built and building for large power systems with relatively long transmission lines. All are custom built to fill system requirements and incorporate proven Allis-Chalmers features which assure long service life and low operating cost.

Whatever problem you may have in electrical power generation, distribution, control or regulation, your Allis-Chalmers representative can help you. For further information on Allis-Chalmers synchronous condensers, write Allis-Chalmers, Milwaukee 1, Wis., and ask for Bulletin 05B7285. A-3345

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Today, America's mighty production machine must meet the biggest order in history. It must produce enough to defend freedom and to maintain our economy!

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- Our lubrication knowledge—acquired through 85 years of experience.

Call on us *any time*.

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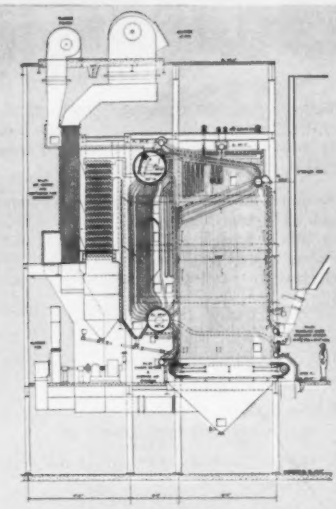
WORLD'S GREATEST LUBRICATION KNOWLEDGE AND ENGINEERING SERVICE

A few outstanding Spreader-Stoker



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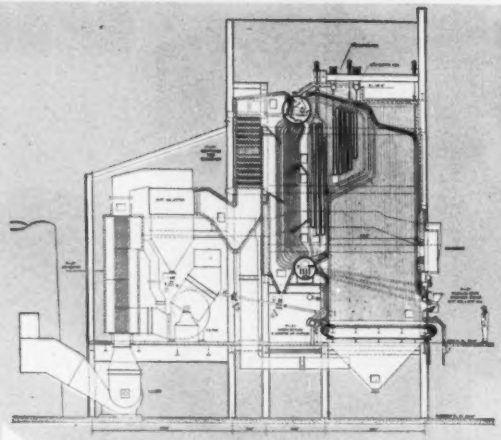
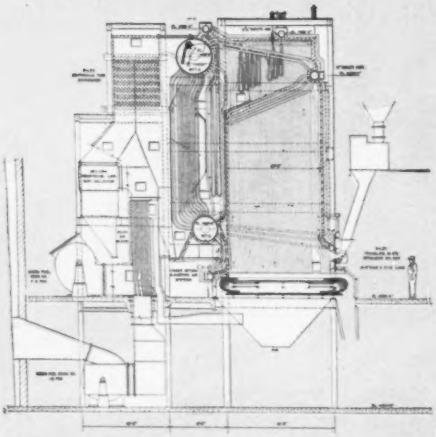
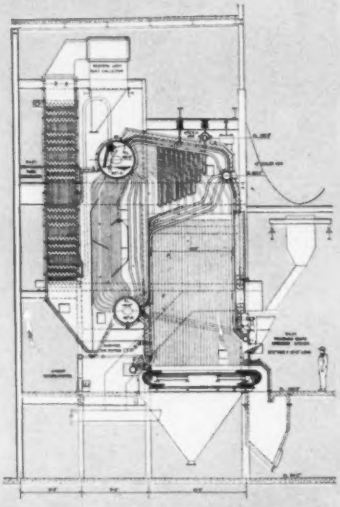
Three 165,000 lbs./hr. 1000 psig 790°F.



CORN BELT POWER CO-OPERATIVE, Humboldt, Iowa
125,000 lbs./hr. 700 psig 825°F.



THE CLIFFS POWER & LIGHT CO., Ispheming, Mich.
100,000 lbs./hr. 450 psig 750°F.



IOWA-ILLINOIS GAS & ELECTRIC CO., Iowa City, Iowa
60,000 lbs/hr. 500 psig 740°F.

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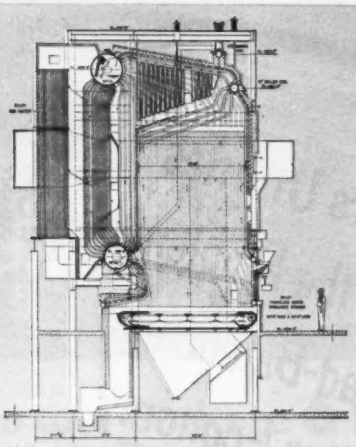
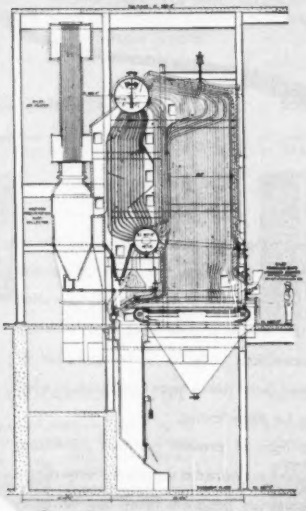
BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • FLUE GAS SCRUBBERS

fired RILEY Steam Generating Units



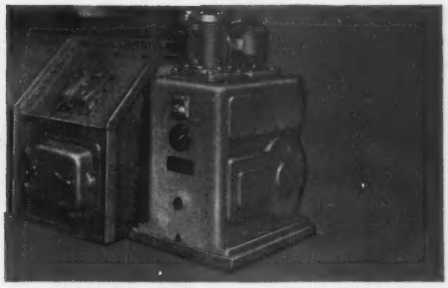
EUGENE WATER & ELECTRIC BOARD, Eugene, Ore.
175,000 lbs./hr. 700 psig 835°F.
Waste wood is also burned.



OHIO EDISON CO., Akron, Ohio
90,000 lbs./hr. 250 psig

Compare the Construction of these Important Parts . . .

Grate Drive

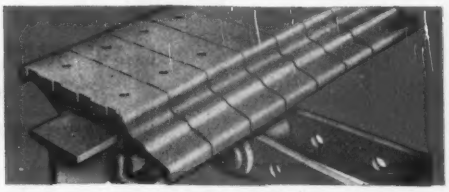


Riley uses a hydraulically driven ratchet drive, completely enclosed and automatically lubricated. This simple rugged drive operates with practically no maintenance and is not susceptible to damage in case of grate obstruction. No sprockets, chains or speed reducers are required.

Feeder Distributor

The use of an adaptation of the Stephenson link mechanism provides complete speed control. The entire mechanism is enclosed and splash lubricated. The overthrowing distributor gives uniform longitudinal and lateral distribution and prevents damage and outage caused by wedging of foreign materials between distributor and housing.

Grate Surface



The grate surface is made up of small grates, only 2 inches wide by 6-inch pitch, mounted on carrier bars. The use of small grates assures low maintenance and long life by providing adequate cooling and the elimination of warping and cracking. Uniform air distribution is obtained.

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs

COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

ECONOMIZERS • WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • AIR HEATERS

Hotpoint Offers Utilities a Plan of Action Geared to the Problem of Load-Building and Load-Balancing During a Guns and Butter Economy

Because our national economy has taken on an entirely new complexion, the electrical industry is now faced with the problem of operating successfully under a dual economy. This new set of conditions calls for a re-appraisal of what we've been doing and a new look at what needs to be done today.

In the light of present complex conditions, Hotpoint has prepared a suggested long-range utility promotion program timed for introduction during the period of Defense Mobilization —a subject both interesting and appropriate.

This timely program ***is designed for presentation in chart form to Utility Management.***

UTILITY DIVISION

Hotpoint Inc.

(A General Electric Affiliate)

5600 West Taylor Street, Chicago 44, Illinois

use one of these 6 Reduced Voltage Starters

To prevent damage to many machines or to materials in process, squirrel cage motors often need gradual acceleration. For such applications, one of these reduced voltage starters will provide the desired speed-torque control.

This line of A-B starters is extremely versatile, providing either manual or automatic starting . . . with 2 or 3 step acceleration . . . or stepless control up to full speed . . . to fit the most critical motor starting requirement.

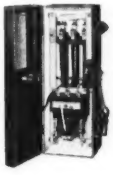
MANUAL—TRANSFORMER TYPE

Manual transformer type starter up to 125 hp, 220 v; 250 hp, 600 v max. Air break or oil immersed contacts. Automatic reset overload relays. Time delay mechanism determines proper time interval for manual switch-over of hand lever.

BULLETIN 646

MANUAL—COMPRESSION TYPE

Manual compression resistance starter up to 50 hp, 220-600 v max. Graphite discs in the insulated tubes are compressed with the hand lever for stepless speed control. Ideal starters for chain or belt drives. Overload relay protection.



BULLETIN 640

AUTOMATIC—3 STEP RESISTANCE

Automatic resistance starter up to 400 hp, 220-600 v max. Accelerates squirrel cage motors in 3 steps. Resistors easily adjusted for ideal starting of motors on power networks. For more than 3-point control, use Bulletin 742 starter, below.

BULLETIN 741

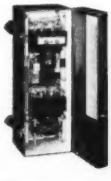
AUTOMATIC—TRANSFORMER TYPE

Automatic reduced voltage starter up to 300 hp, 600 v max. An accurate timing relay controls the accelerating time. Operator touches start button—the starter does the rest. Available in standard, watertight, and dust-tight enclosures.

BULLETIN 746

AUTOMATIC—2 STEP COMPRESSION

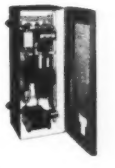
Automatic resistance starter with preset adjustable graphite resistors up to 250 hp, 220-600 v max. Push button closes starting circuit through resistors. Later, timing relay closes running contactor and cuts out the starting resistors.



BULLETIN 740

AUTOMATIC—STEPLESS TYPE

Fully automatic resistance starter with solenoid controlled graphite disc resistors rated up to 500 hp, 220-600 v max. Stepless control of current and speed. Acceleration adjustable to avoid lamp flicker. Overload relay protection.



BULLETIN 742

Write for Bulletins to Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin

A-B Quality

ALLEN-BRADLEY

REDUCED VOLTAGE STARTERS

QUALITY

351-MR

for VELVET SMOOTH ACCELERATION

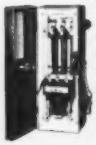
use these Allen-Bradley Starters with Graphite Compression Resistors

Cutaway view of Allen-Bradley graphite resistor tube showing discs, insulating lining, and the pressure terminal.

With these Allen-Bradley compression resistance starters you can start squirrel cage motors with such velvet smoothness that there is no voltage dip . . . no lamp flicker. The secret of this stepless acceleration lies in the smooth control of the Allen-Bradley graphite compression resistors which are shown below.

BULLETIN 640 MANUAL
Stepless Resistance Starter

The motor current passes through the graphite disc resistors. Compressing them with the hand lever reduces the starting resistance steplessly until it is shunted automatically by the running contactor.



Bulletin 640 manual starters have a hand lever for manually compressing the resistors. At maximum speed position, a magnetic contactor automatically connects the motor to full voltage.

BULLETINS 740 & 741 AUTOMATIC
2 and 3 Step Resistance Starters

In these two resistance starters the adjustable resistors are arranged in 2 or 3 steps. Each step is cut out, successively, by timing relays. These starters can be easily adjusted for equal current inrush per step.

Bulletin 740-741 starters are rugged, automatic starters.

BULLETIN 742 AUTOMATIC
Stepless Resistance Starter

In this starter, compression of the graphite discs is done automatically by a solenoid mechanism. Absolutely velvet smooth acceleration is obtained. No other starters provide similar stepless control.

Bulletin 742 resistance starters prevent lamp flicker on network systems. They provide automatic stepless starting for machines and processes which are easily damaged by sudden starting.

BULLETIN 646 TRANSFORMER TYPE STARTER

For loads with high starting friction, requiring sudden applications of power, use the Bulletin 646 manual or the Bulletin 746 automatic transformer type starters.

Write for Bulletins to Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin

ALLEN-BRADLEY
REDUCED VOLTAGE STARTERS
QUALITY

A-B Quality

351-MR

"Our new International L-192 just played with the load!"

This International L-192 with special utility body and winch recently went to work for People's Gas & Electric Co., Mason City, Iowa. Vehicle weight empty—15,000 pounds. Wheel Base — 175". 5-Speed transmission. Single-speed rear axle; Ratio: — 7.16 to 1.

When the driver of a new truck says: "It just *played* with the load," that statement *means* something.

In the case of this new International L-192, it meant "playing" with several 55-foot telephone poles and 4 *heavy* transformers the first day the truck was on the job. That's the kind of right-for-the-job performance you can expect from *every* International . . . from the smallest pick-up to the biggest model in the line.

Here's why:

1. Internationals are *heavy-duty engineered* to give you true truck stamina that keeps 'em running stronger, longer and at lower cost to you . . . no matter *what* job they have to do!

2. Internationals have the **COMFO-VISION CAB**—the *roomiest* on the road! Deep-cushioned seats, controlled heat and ventilation, *plus* perfect visibility through that big, one-piece Sweepsight windshield make this cab a driver's dream come true.

3. Internationals have new *valve-in-head engines*—proved and perfected in the world's largest all-truck engine plant to give you efficient balance of power, speed and economy.

4. Internationals are the world's most complete line of trucks, with 87 basic models and thousands of specialized variations, with Gross Vehicle Weights varying from 4,200 pounds all the way up to 90,000 pounds.

5. Internationals can be speedily serviced, because the International Truck you buy is backed by the world's largest, most complete, best equipped *exclusive* truck servicing system.

For the complete story see your nearest International Truck Dealer or Branch soon.

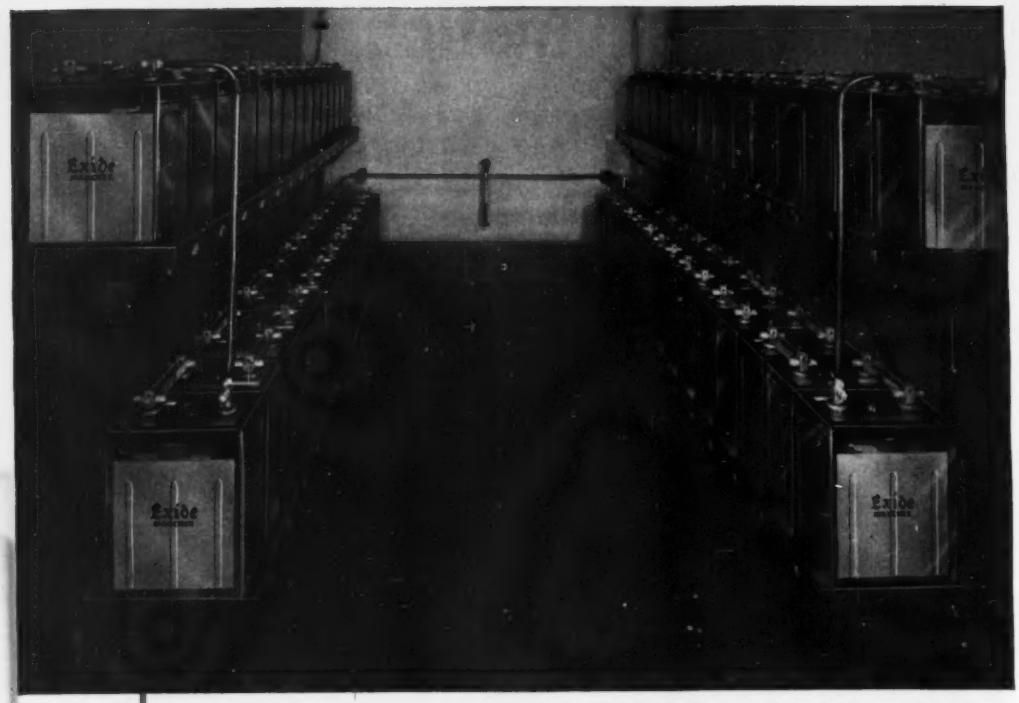
International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

International Harvester Company • Chicago

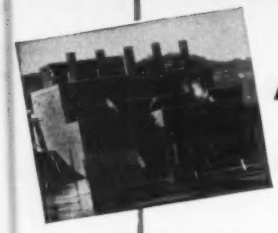
See the new

INTERNATIONAL TRUCKS

Every model heavy-duty engineered for longer life



Duquesne Light Company's Phillips Power Station, South Heights, Pa. Breaker control battery is 60-cell FME-17 Exide-Manchex. Rack is Exide 37344, 2-step.



AT DUQUESNE LIGHT COMPANY'S Phillips Power Station breaker control battery is Exide-Manchex

Another great utility turns to dependable Exide-Manchex Batteries. In Duquesne Light's modern Phillips Power Station, located on the Ohio River near Pittsburgh, positive switchgear operation is assured by a 60-cell FME-17 Exide-Manchex Battery. This battery controls switchgear of 69 KV, 1200 Amp. breakers, and is set up for emergency duty on motor operated steam valves.

This is just one of the many modern stations throughout the country where dependable performance is provided by Exide-Manchex Batteries. Consider these benefits from Exide-Manchex.

POSITIVE OPERATION: Power is delivered at high or low rates, providing dependable performance at ample voltage with no switching failures.

INSTANTANEOUS POWER, capable of discharging at high rates for switchgear operation and of providing adequate reserve power for the dependable performance of all other control circuits and also emergency lighting.

LOW OPERATING COST: Extremely low internal resistance. Power required to keep battery floated and fully charged ranges between 0.25% and 1.0% of the 8-hour discharge.

LOW MAINTENANCE AND REPAIR COSTS: Water required about twice a year. No change of chemical solution needed during life of battery. Repair costs negligible.

UNUSUALLY LONG LIFE . . . due to sturdy construction; the famous manchester positive plate; a combination of specially treated wood and plastic separators; and other exclusive features.

GREATER CAPACITY in a given amount of space avoids overcrowding of equipment.

These are the features that help to make Exide-Manchex *your best battery buy* for all control and substation services.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto
"Exide" and "Manchex" *Reg. Trade-marks U. S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 63 YEARS . . . 1951

Save copper with
CHASE BUS CONDUCTORS

You can cut your copper requirements for bus conductors up to 36% by using Chase ventilated square copper tube bus conductors, instead of rectangular flat bars.

Chase square copper tube buses can withstand heavy short circuit stresses because of their high mechanical strength. The large cross-sectional areas permit longer spans between supports without unduly large sags.

They have high thermal conductivity and low resistance voltage drop and power loss per pound of metal. Send for the Chase Copper Bus Conductor Handbook giving specifications and installation data.

Chase BRASS & COPPER

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Chicago	Houston†	Newark	Rochester†	office only)
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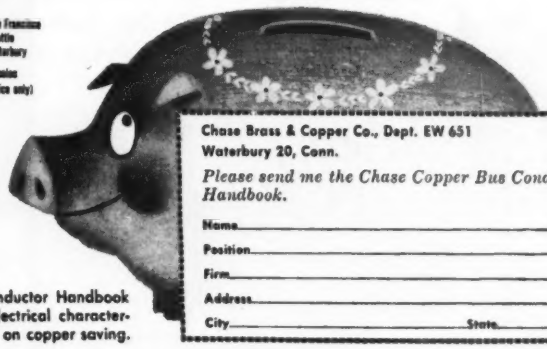


FREE Chase Bus Conductor Handbook gives physical and electrical characteristics as well as data on copper saving.

Chase Brass & Copper Co., Dept. EW 651
Waterbury 20, Conn.

Please send me the Chase Copper Bus Conductor Handbook.

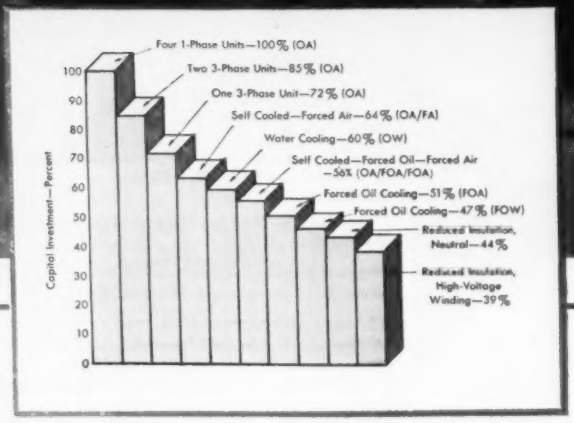
Name_____

Position_____

Firm_____

Address_____

City_____ State_____



Summation of possible reductions in investment for generating station transformer banks.

REDUCED INSULATION LEVELS

Cut Capital Investment 5% to 15%

Savings in power transformer costs amounting to 50% and more—made possible by use of three-phase units supplemented by water and forced-oil cooling—can be increased an additional 5% to 15% by reducing insulation.

If a transmission system is solidly grounded, it is often feasible to reduce insulation in the high-voltage neutral, with cost savings up to 5%. If dynamic and switching surges can be limited to 80% of normal values, insulation in the entire high-voltage winding can be reduced. This represents an additional savings of approximately 10%.

Thus, depending on the application, capital savings that range all the way from 15% to more than 60% can be realized by taking full advantage of modern transformer developments.

WESTINGHOUSE POWER TRANSFORMERS are small and lighter per kva than any other transformer on the market. As a result, you can expect these additional savings.

1. **Reduced space required.**
2. **Smaller foundations.**
3. **Smaller superstructures.**
4. **Lower field-assembly expense . . . transformers shipped more completely assembled.**
5. **Lower maintenance expense . . . rugged, all-welded construction plus smaller size.**

Yet all this is merely a portion of the savings possible with Westinghouse Transformers. Our representatives will be glad to discuss additional features that mean big savings to you. Phone today, or write: Westinghouse Electric Corporation, P. O. Box No. 868, Pittsburgh 30, Penna.

J-70581

WESTINGHOUSE POWER TRANSFORMERS ARE SMALLER AND LIGHTER PER KVA THAN ANY OTHER TRANSFORMER . . . YET THEY GIVE SUPERIOR PERFORMANCE

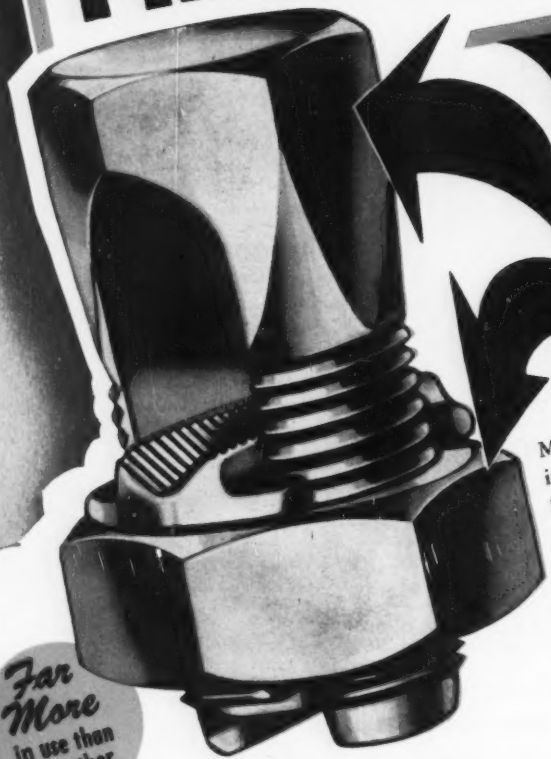
YOU CAN BE SURE.. IF IT'S

Westinghouse

POWER TRANSFORMERS

Approved by UNDERWRITERS LABORATORIES

Here's the MOST PRACTICAL design



LARGER SURFACES

to grip with wrenches from ANY ANGLE—using either a socket or open-end wrench.

MORE STRENGTH. In competitive torque tests, Penn-Union Split-Bolt Connector withstands 15% to 55% higher clamping pressures.

MAXIMUM CONTACT provided by V-groove; conductors protected by beveled slot.

PRECISION MADE, with rigid inspection. Smooth accurate threads assure maximum pressure —permanently maintained.

Far More in use than any other

For taps, dead-ends, parallel connections, etc., in any location. Can be furnished in bronze or aluminum. Re-usable over and over.

With or without retainer

PENN-UNION ELECTRIC CORPORATION, Erie, Pa.

Canada: Dominion Cutout Company, Ltd., 250 Richmond St. West, Toronto

The COMPLETE Line of Conductor Fittings

PENN-UNION

HOW LONG

EVER since 1935 when the first Simplex-ANHYDREX rubber-jacketed cables were put on the market, they have shown themselves to be remarkably free from trouble. Not once in all that time has an ANHYDREX Cable failed because of water absorption. That's why we can't give an adequate idea of the length of service you can expect from ANHYDREX Cable.

But accelerated aging tests constantly carried on by the Simplex Laboratories give us good reason to predict that their service life will be long and trouble-free.

Tests for mechanical water absorption prove that during seven days' immersion at 158°F. (70°C.) Anhydrex SA insulation absolutely will not absorb more than 20 mg. of water per square inch of exposed surface.

Tests for electrical stability in water show that after one day's immersion at 158°F. (70°C.) Anhydrex SA has a dielectric constant that will not exceed 3.2. The increase in capacitance between one and eight days' immersion at 158°F. (70°C.) will not exceed 3.5% for insulation thicknesses greater than 4/64" or 5% for thicknesses of 4/64" and less.

Physically too, ANHYDREX Cables are tops. Their tough neoprene jacket stands up under year-in, year-out exposure to soil acids and alkalies and is fully able to withstand all manner of rough handling. If you run your cables up above ground you'll find it provides protection against weather hazards, sunlight, and swaying tree branches.

Performances in the field back up the story our lab tests tell. Why not discover, yourself, just what these figures can mean? . . They're easily translated into added years of service per cable plus worthwhile savings for you.

SIMPLEX-ANHYDREX

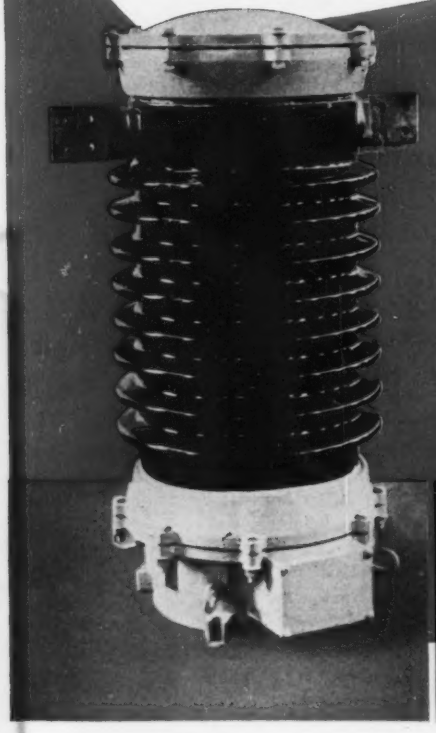
SIMPLEX WIRE & CABLE CO. 79 SIDNEY ST. CAMBRIDGE 39, MASS

Uptegraff

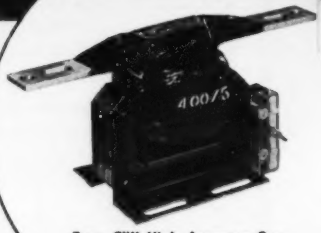
HIGH VOLTAGE *outdoor* CURRENT TRANSFORMERS

For Metering Service

At the left, is the Uptegraff OCP Transformer, rated at 69 KV, 2000/1000-5 amp. Below are shown six OCP Transformers 69 KV, 600-5 amp. rating.



FOR INDOOR SERVICE

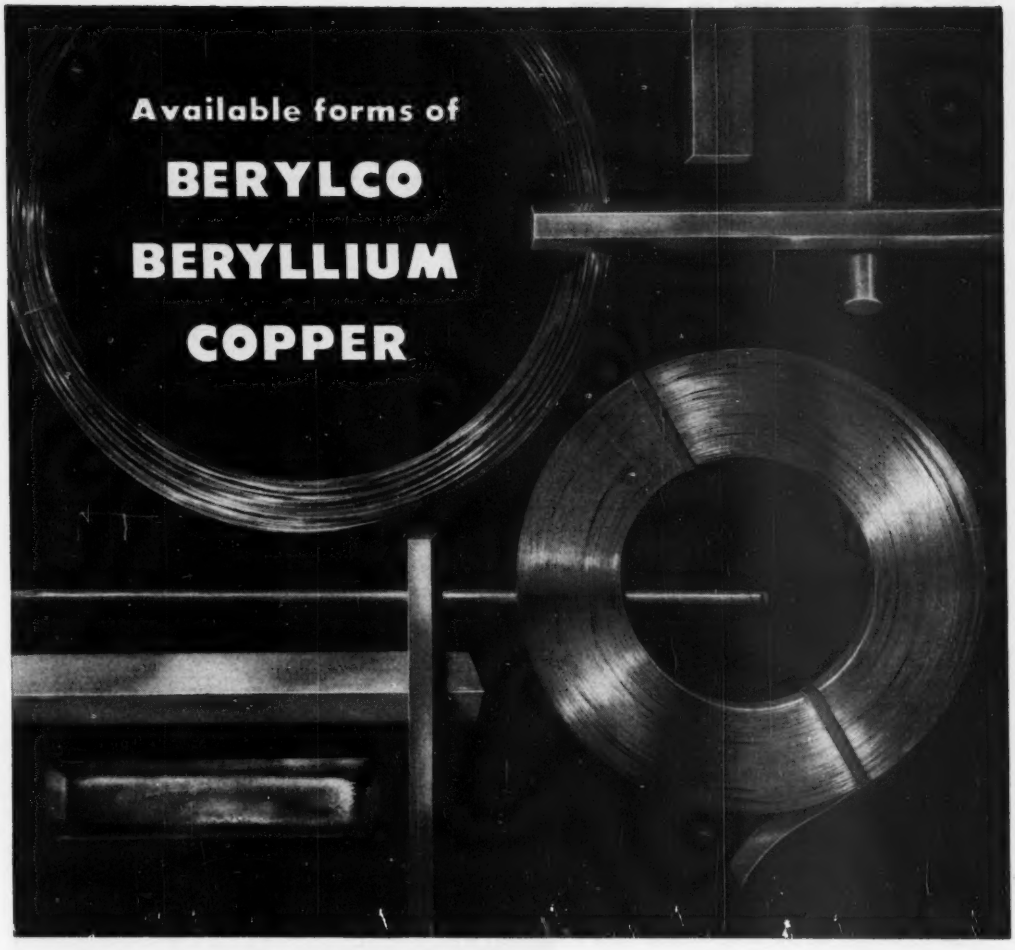


Type CIW High Accuracy Current Transformer, for indoor service. Accuracy class same as type OCP.

Designed and built for outdoor service, the Uptegraff High Voltage Current Transformers shown above are compact and dependable. Transformer core and coils are contained entirely within the insulator housing. They are made in accordance with NEMA standards, and meet ASA accuracy classification 0.3 with burdens B 0.1, B 0.2, B 0.5 and B 2.0.

Write for complete details.

R. E. UPTEGRAFF Manufacturing Co. Scottdale, Pa.



You can buy Berylco in casting ingots. You can buy it as rod and bar, in rounds, rectangles, hexagons or squares. You can buy it as heat-treatable and pre-tempered wire . . . or as cold-rolled, slit-edge strip.

However you buy it, Berylco will give you a unique combination of properties not otherwise obtainable. To find out what Berylco can do for you, take advantage of the technical knowledge of the world's largest producer of beryllium copper. Blueprint your problem—or send for sample material.

The Beryllium Copper Technical Bulletins, issued monthly, are full of helpful information about end uses. To receive your copy regularly, write on your business letterhead.

BERYLCO THE **BERYLLIUM** CORPORATION

DEPT. F, READING 10, PENNSYLVANIA

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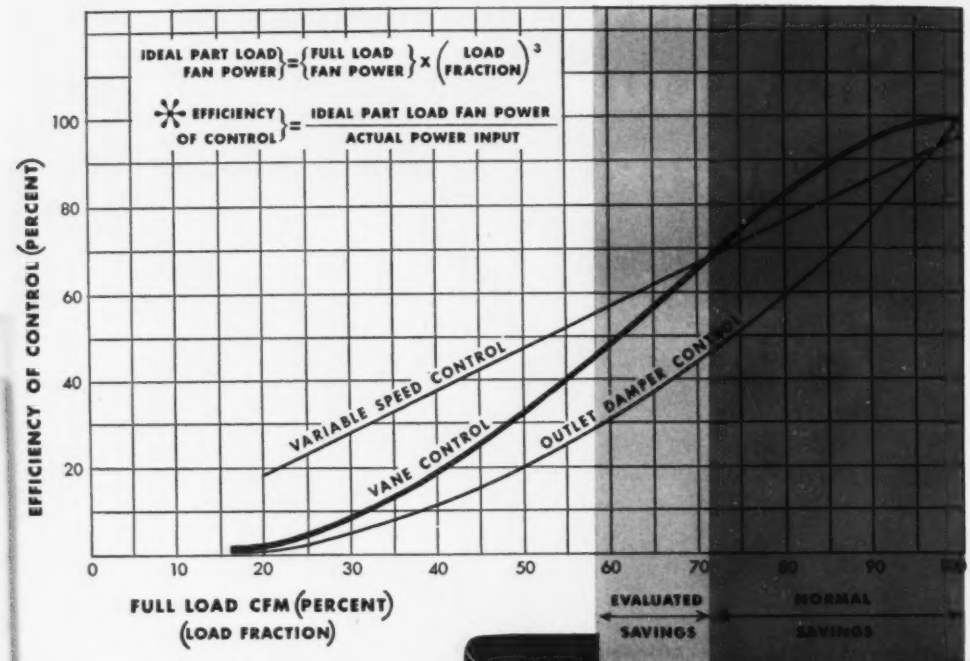
FOR PART LOADS

USE STURTEVANT VANE CONTROL® FOR HIGH EFFICIENCY AT LOW COST



If you operate in this range—and most plants do—VANE CONTROL is the economical choice

Have you ever considered the relative efficiencies of methods of mechanical draft fan volume control—and then evaluated them against first cost? Do so, and you will find Sturtevant Inlet VANE CONTROL is the best. It is high in *efficiency of control** and low in first cost.

Whether for forced or induced draft, the *new* VANE CONTROL is a simple and reliable regulator of fan output—a control which responds instantly to varied demands, and yields major power savings at reduced loads.

A new Bulletin, DB 92-810, describes the mechanical improvements developed for Sturtevant VANE CONTROL and its use in mechanical draft, industrial and ventilating applications. Write today for a free copy. Westinghouse Electric Corp., Sturtevant Division, 152 Damon St., Hyde Park, Boston 36, Mass.

YOU CAN BE SURE...IF IT'S **Westinghouse**

PUTTING *Air* TO WORK

J-80220

The "BOOKLET-OF-THE-MONTH" for every industry that uses petroleum products

Here is a practical cooperative plan that can help you cut controllable costs and offset higher non-controllables. From this single source you can get effective assistance on any problem that involves a petroleum product—any type of petroleum product.

Gulf Periodic Consultation Service makes available to you the regular counsel of one or more trained engineers, backed up by technologists who are skilled in every phase of petroleum science and who have years of experience with practically every type of industrial process and equipment.

This knowledge and experience can be applied profitably to your operating and maintenance problems. In your continuing efforts to increase manufacturing efficiency and profits, here is an important and definite step you can take—at once. Send for your free copy of the booklet which explains this cost-cutting service.

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PETROLEUM AND ITS PRODUCTS

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Room 722, Gulf Building, Pittsburgh, Pa.

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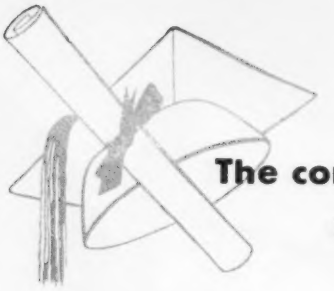


The condenser tube most likely to succeed

The college graduate voted *most likely to succeed* may be a misfit in the job he gets.

It's the same with condenser tubes.

When our engineers suggest a specific tube as most likely to succeed in your condenser, you can be sure their opinion is firmly founded on facts.

The American Brass Company's engineers are backed by accurate information on the performance and cost of tube materials under many operating conditions.

The experience and counsel of our Technical Department are at your service. Just write to The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

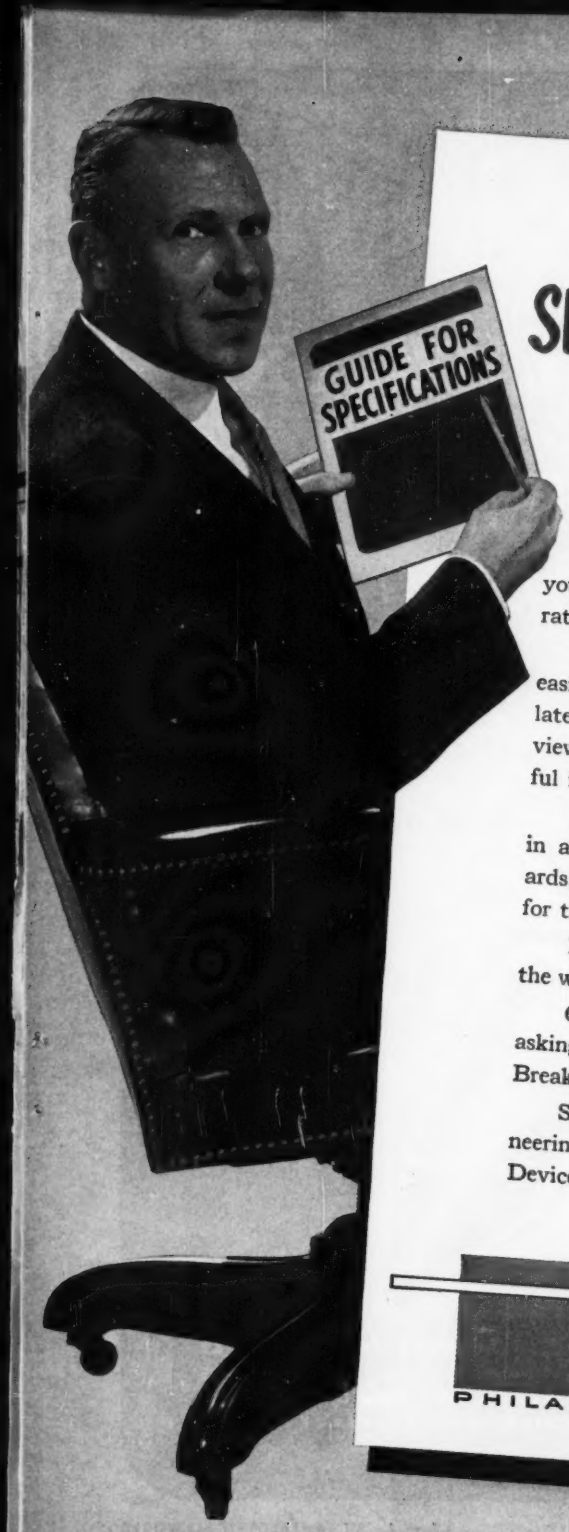
ANACONDA CONDENSER AND HEAT EXCHANGER TUBE ALLOYS

Arsenical Admiralty 439
Ambraloy 927 (Aluminum Brass)
(U. S. Patent No. 2,003,685)
Ambraloy 901 (Aluminum Bronze)
Super-Nickel 702
Cupro-Nickel 754 (U. S. Patent No. 2,074,604)
Red Brass 24 (85%)
Deoxidized Arsenical Copper 108
Deoxidized Copper 939

for efficient heat transfer

ANACONDA®

CONDENSER TUBES



SPEEDIER SWITCHGEAR DELIVERY!

Use this I-T-E guide to help you prepare your switchgear specifications quickly and accurately.

It will make your specification preparation easier, whether it be power switchgear or isolated phase bus, because it is written from your viewpoint and contains basic information helpful in developing your single line diagram.

It will help you get your equipment built in accordance with applicable industry standards, and it will provide you with a sound basis for the accurate evaluation of bids.

It will save you *time* and *money*, paving the way to speedier delivery of your switchgear.

Guide for Specifications is yours for the asking. Write for it today! I-T-E Circuit Breaker Company, Philadelphia 30, Pa.

Subsidiaries: Railway and Industrial Engineering Co., Greensburg, Pa., Eastern Power Devices, Ltd., Toronto, Canada.

I-T-E COMPANY

PHILADELPHIA, PENNA.

Dependable, Permanent Grounding!

BLACKBURN *Copper-Bonded* GROUND ROD

Completely Covered - - - Molecularly Bonded to Steel Core---To Insure Lasting Protection

Note uniform copper covering, molecularly bonded to steel core. Cross section of copper is greater than No. 4 wire. Both point and driving end completely covered to totally protect steel.

LISTED UNDER RE-EXAMINATION SERVICE UL OF UNDERWRITERS' LABORATORIES, INC.

For Your Protection!

Here is a quality ground rod from a reliable mid-western source — a stable, dependable source of supply — a strategically located source for quick shipment to central, southern and western sections of the country.

For your convenience BLACKBURN maintains numerous, conveniently-located jobber stocks, backed up by factory shipments from St. Louis.

For a dependable source of a truly quality rod specify BLACKBURN when you order.

Distributed on the West Coast by
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JASPER BLACKBURN PRODUCTS CORP.
FIRST, MADISON & CLINTON STS.
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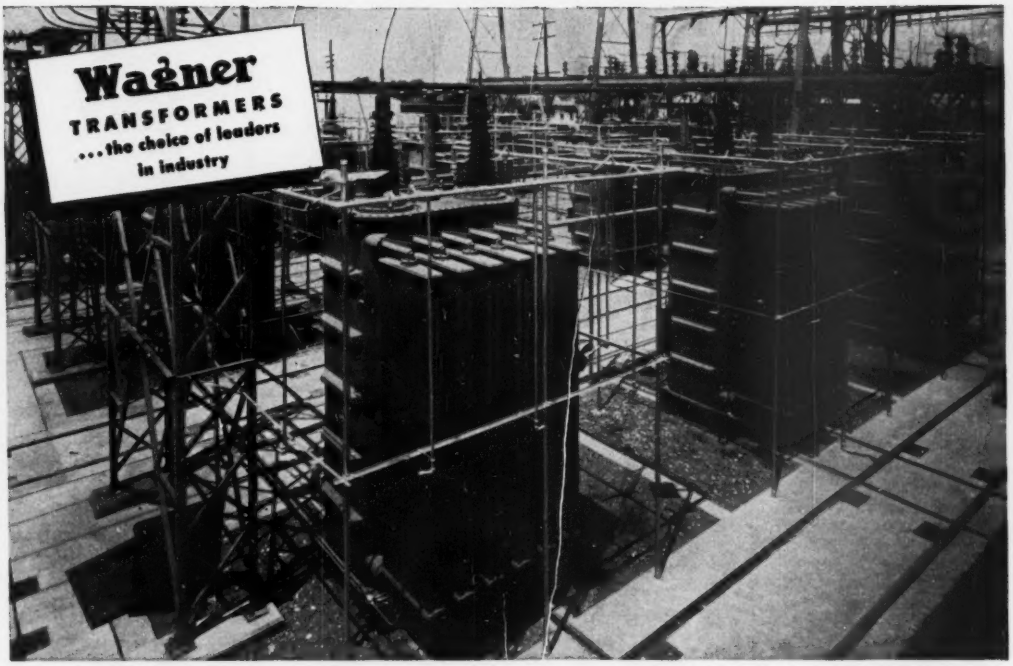
BUILDERS OF QUALITY PRODUCTS



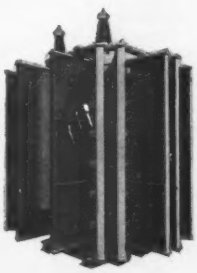
Wagner Transformers provide New Orleans Public Service dependable distribution of power for tomorrow

The new Midtown Substation of New Orleans Public Service, Incorporated, helps assure a plentiful supply of vital electricity for the steadily increasing needs of New Orleans and its rapidly-expanding industrial area.

The ten oil-filled Wagner Power Transformers used in this substation are each rated 5000 kva self-cooled, 6667 kva forced-air-cooled, 115,000 volts Delta to 13,800 volts Y, with full capacity taps at 110,000, 104,500, and 99,000 volts, and reduced capacity tap at 93,500 volts.

Wagner transformers are an important part of the equipment of many power companies because they have a reputation for unfailing dependability established through sixty years of service to the power industry. The complete story is told in Bulletin TU-181—you should have a copy.

Call the nearest of our 31 branch offices for competent advice on your next transformer installation.



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6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

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1891 WE 1951

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AUTOMOTIVE BRAKE SYSTEMS • AIR AND HYDRAULIC

TM-13

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Single Phase
Detachable Meters

Single Phase
Bottom-Connected Meters

Polyphase
Detachable Meters

Polyphase
Bottom-Connected Meters

Combination Polyphase
and Thermal Watt
Demand Meters

Polyphase Thermal
KVA Demand Meters

Polyphase
Switchboard Watthour
Meter-Flexitest Case

Polyphase Switchboard
Combination Watthour
and Thermal Watt Demand
Meter-Flexitest Case

Polyphase
Recording Differential
KW Demand Meters

Polyphase Recording
KVA Demand Meters

Polyphase
Totalizing Recording
KVA Demand Meters

Polyphase Indicating
KVA Demand Meters

Combination Polyphase
and Thermal KVA
Demand Meters

Polyphase KVA Demand
Impulse Senders

Polyphase Impulse
Operated Recording
KW Demand Meters

Polyphase Impulse
Operated Recording
KVA Demand Meters

Single Phase
Varhour Meters

Block Interval
KW Demand Registers—
Indicating and Cumulative

Phase Shifting
Transformers

Portable Standard
Watthour Meters

Combination Single Phase and Thermal Watt Demand Meters

Polyphase Recording Demand Meters

Polyphase Switchboard Totalizing Watthour Meter-Flexitest Case

Single Phase Combination Watthour Meter and Time Switch

Impulse Totalizing Relays

There's a Westinghouse meter for every application!

Forecasts of unprecedented load growth in the coming years suggest many changes in metering practices. That's why a *complete* line of metering equipment holds an advantage for you. Specifically . . .

It's assurance that your *future* as well as your present needs can be readily fulfilled.

The wide variety of meters illustrated here is typical of the broad line of Westinghouse Meters offered to you. These and many more types are available to give you low-cost metering for every circuit application . . . three wire, four wire, wye or delta, or totalizing.

To meet your expanding needs Westinghouse has continually pioneered new devices to make the desirable changes in metering methods a practical reality. And you have assurance of dependability because every Westinghouse Meter contains the quality and refinements that result from the engineering of a complete line. So whether your needs involve metering large loads or small, single or polyphase circuits, kw or kva, Westinghouse can meet your requirements.

For more information write for Booklet B-4665. Call your Westinghouse office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40408

YOU CAN BE SURE... IF IT'S Westinghouse METERS

Get Full Electrical

WITH MECHANICALLY TRIP-FREE PNEUMATIC OPERATION

YOUR CIRCUIT BREAKER is a long term investment that pays dividends daily in protection for your electrical system. Naturally, you want full electrical protection — the best protection your money can buy. That's an important reason why your pneumatically operated circuit breakers should be mechanically trip-free. Unless they're mechanically trip-free they may fail to reopen properly when closed against a fault condition.

TRIP-FREE ADVANTAGES

Opening action of Allis-Chalmers pneumatically operated breakers is immediate and positive, because tripping instantly uncouples contacts from the closing mechanism. Opening occurs whether the breaker is in normal closed position or is "closing in" on a short circuit.

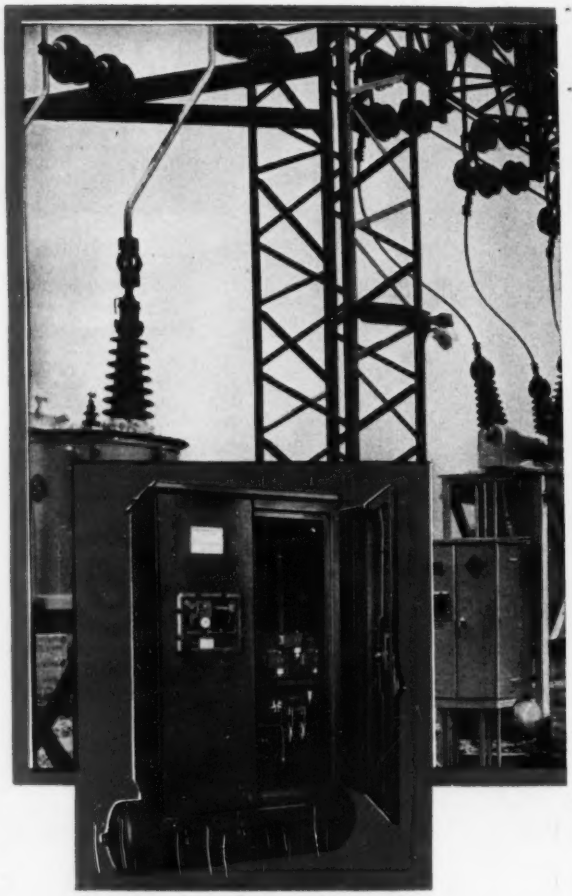
Breaker opening is independent of the closing piston and air valves. There is no drag from the closing mechanism.

Designed for high speed (20 cycle) reclosing, these breakers combine fast acting power of pneumatic operation with fast recoupling of contacts and reclosing mechanism. Stored energy for fast closing comes from a self contained air pressure tank with compressor.

You can gain the advantages of mechanically trip-free operation in every Allis-Chalmers power oil circuit breaker — whether pneumatically, solenoid or manually operated. It is standard in all sizes and ratings.

More than one-half century of experience stands behind the dependable operation of these breakers, serving industry since 1899. This dependability is being proved daily in utility and industrial installations coast to coast.

Call your Allis-Chalmers district office for more information on power oil circuit breakers. Or write Allis-Chalmers, Milwaukee 1, Wis., for your copy of the mechanically trip-free pneumatic operator bulletin. A-3355



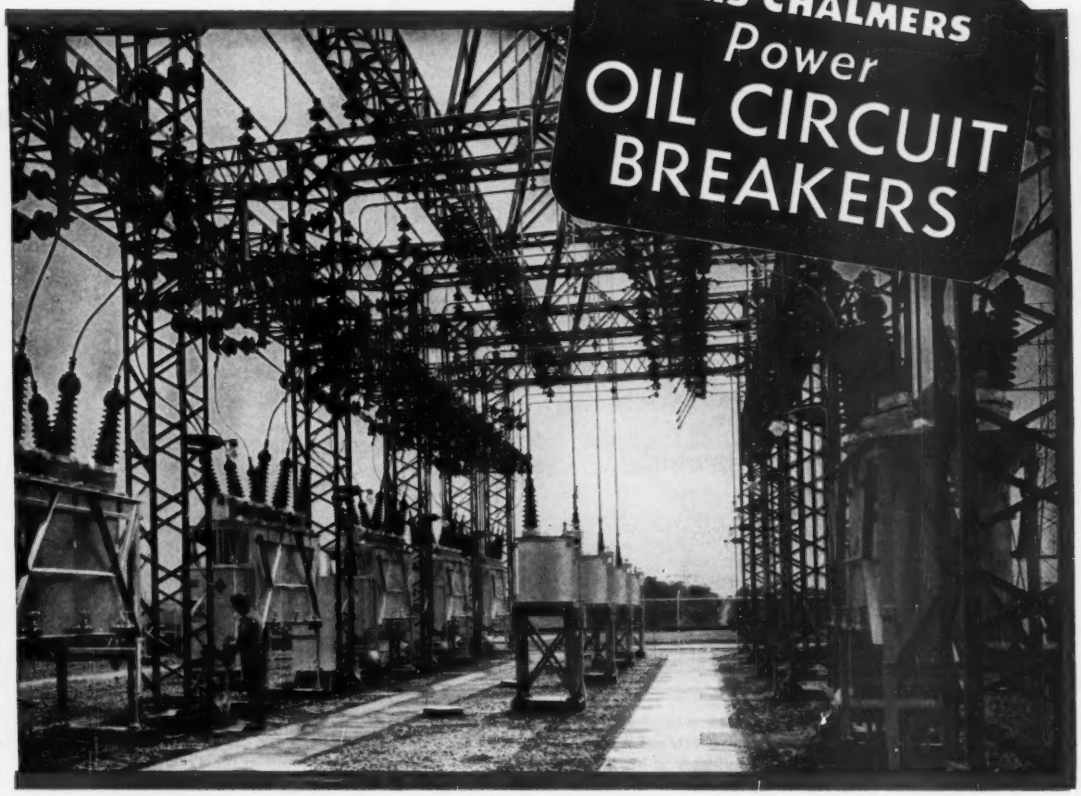
Weatherproof operator housing furnishes double protection against moisture.

For keeping out wind-driven weather, double doors with full length hinges are recessed. They have provisions for gasketing. The large safety glass window in the door permits a quick check of air pressure gauge, position indicator, operation counter and nameplate.

The operator is protected against condensation. The air tank is outside of housing. Thermostat controlled electric heaters keep both the operator and housing interior above ambient temperature. All parts are rustproof.

Protection

ALLIS-CHALMERS
Power
OIL CIRCUIT BREAKERS

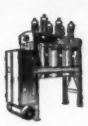


These FZO-151 circuit breakers are equipped with the reliable mechanically trip-free pneumatic operator. The *Ruptor* interrupting device and many other important features also contribute to your assurance of positive operation. The FZO-151 is rated 69 kv up to 3,500,000 kva with 8 to 5 cycle opening, 20 cycle reclosing.

Ruptor and *Unitop* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

MECHANICALLY TRIP-FREE PNEUMATIC OPERATOR IS STANDARD EQUIPMENT ON ALL THESE ALLIS-CHALMERS OUTDOOR POWER OIL CIRCUIT BREAKERS



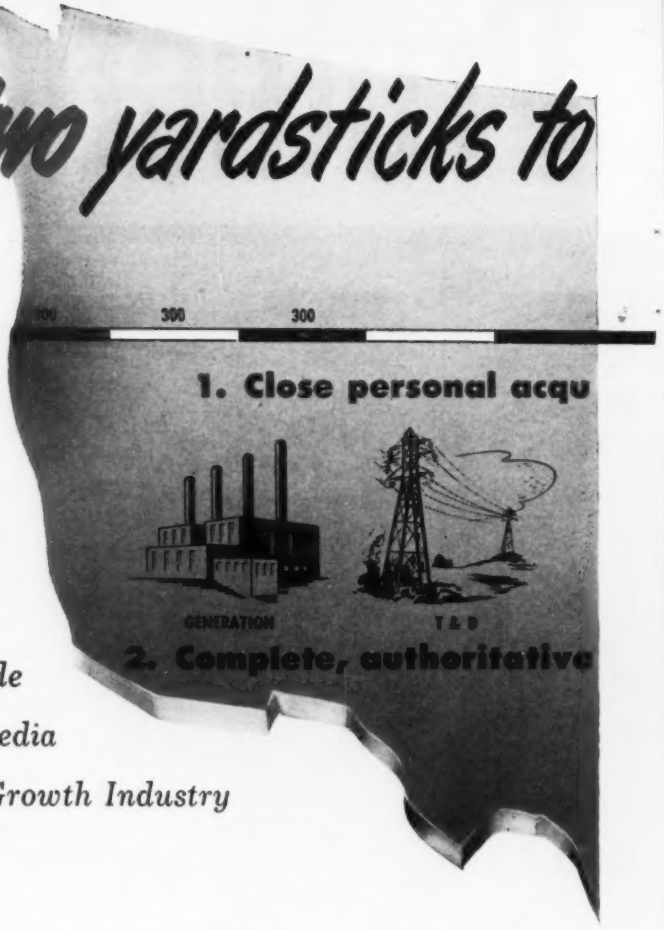
Type FZO-150 *Unitop* breaker 14.4 to 46 kv, 8-cycle opening, 20-cycle reclosing*

Type FZO-151 . . . 69 kv, 5 or 8-cycle opening, 20-cycle reclosing*

Type BZO-160 . . . 69 kv, 8-cycle opening, 115 to 230 kv — 3 or 5-cycle opening with 20-cycle reclosing*

*20-cycle reclosing standard for 600 and 1200 amp breakers

You need two yardsticks to



But together they provide your strongest selling media for reaching the Great-Growth Industry

Every state in the union is assigned to an Electrical World editor who knows the electric power industry in his territory like a veteran pilot knows his harbor.

That's *half* the story. Every *phase* of the industry, as well as every state, must be covered – These are its separate operations:

Electric power is produced in a generating (or hydro) plant, transmitted to a substation, distributed to factories, homes, and stores, and used in a thousand-and-one ways to light the lights of Broadway, run a farmer's milking machine, heat the furnaces of steel mills and run electric clocks. And besides producing, delivering and using electric power, men must *sell* it, and measure it.

Yes, geography is only half the story. Besides covering a specific territory, each editor also must be an expert on some part of the industry. For instance, one editor's *topical responsibility* is generation of electricity; another is responsible for the commercial side of the industry, and still another keeps a sharp eye on all that occurs in transmission and distribution, and so on. They are well-known throughout the industry as authorities in their fields. They *guide* the other traveling editors, and make doubly sure that no important development or trend is overlooked.

It takes a big editorial staff to make sure that every separate industry operation is covered. In addition to its headquarter staff, Electrical World depends on 12 traveling editors and 30 correspondents, *plus* McGraw-Hill's six domestic news bureaus and vast World-News organization. And 345 industry leaders, who live in 112 cities from coast to coast, wrote Electrical World articles last year.

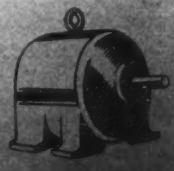
All told, there's no bigger job of industrial reporting in America, and there's no better place to display your product and explain its performance to the men who direct and operate the great growth industry.

measure our editorial job

aintance with the industry in every state

SALES

MANUFACTURING



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coverage in each subject

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Electrical World

JOURNAL OF THE GREAT GROWTH INDUSTRY FOR 77 YEARS

A McGRAW-HILL MAGAZINE
McGRAW-HILL BUILDING, NEW YORK 18

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kills 'em dead!

Lowest Cost way to get rid of brush, scrub trees, sprouts and weeds

Thompson's Quick, positive kills assured with tested Bramble-Weedicide (2,4,5-T, 2,4-D Low Volatile Esters)

When you spray Thompson's brush and weed killers, you kill 'em dead and for keeps — at a fraction of the cost of other methods. Foliage spray, stump or basal bark treatment, you get positive results at bottom dollar cost. That's because Thompson's brush and weed killers embody the newest technology — they are low volatile for honest economy and low polarity for quicker and more complete absorption.

Thompson's exclusive Middle West research helps you to cut costs and avoid errors. Tells you when to spray, when to use basal bark treatment, what to apply and how to mix it for maximum economy and results. For free, helpful charts and information, write — describing nature of growth to be killed off — to: Research Department, Thompson Horticultural Chemicals Corp., St. Louis 3, Mo.

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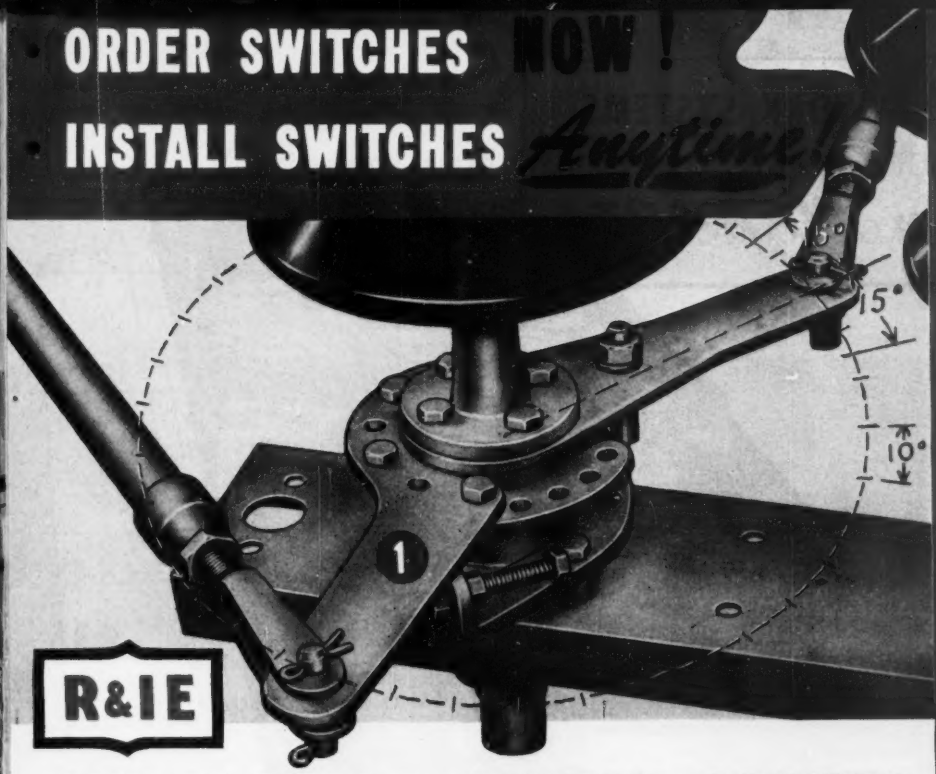
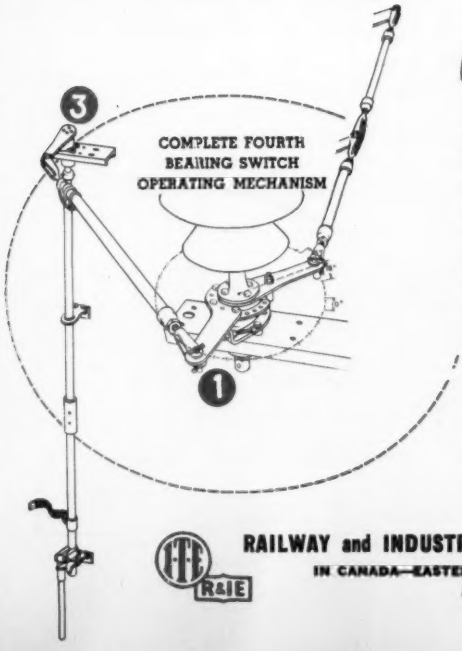
• ORDER SWITCHES NOW!
• INSTALL SWITCHES *Anytime!*



R&IE

MULTI-ANGLE SWITCH CRANKS
Save Engineering and Installation Time!



CHECK THE FACTS

1. **UNIVERSALLY ADJUSTABLE**–Permits Angular crank adjustment to within 5 DEGREES of desired operating location.

2. **NO WAITING FOR FINAL STRUCTURAL DETAILS** to order switches. Adjustable features of crank permit switches to be installed at any time on any type structure.

3. **RANGE OF POSITION** — Unlimited. Fourth Bearing can be placed in any desired position on the structure.

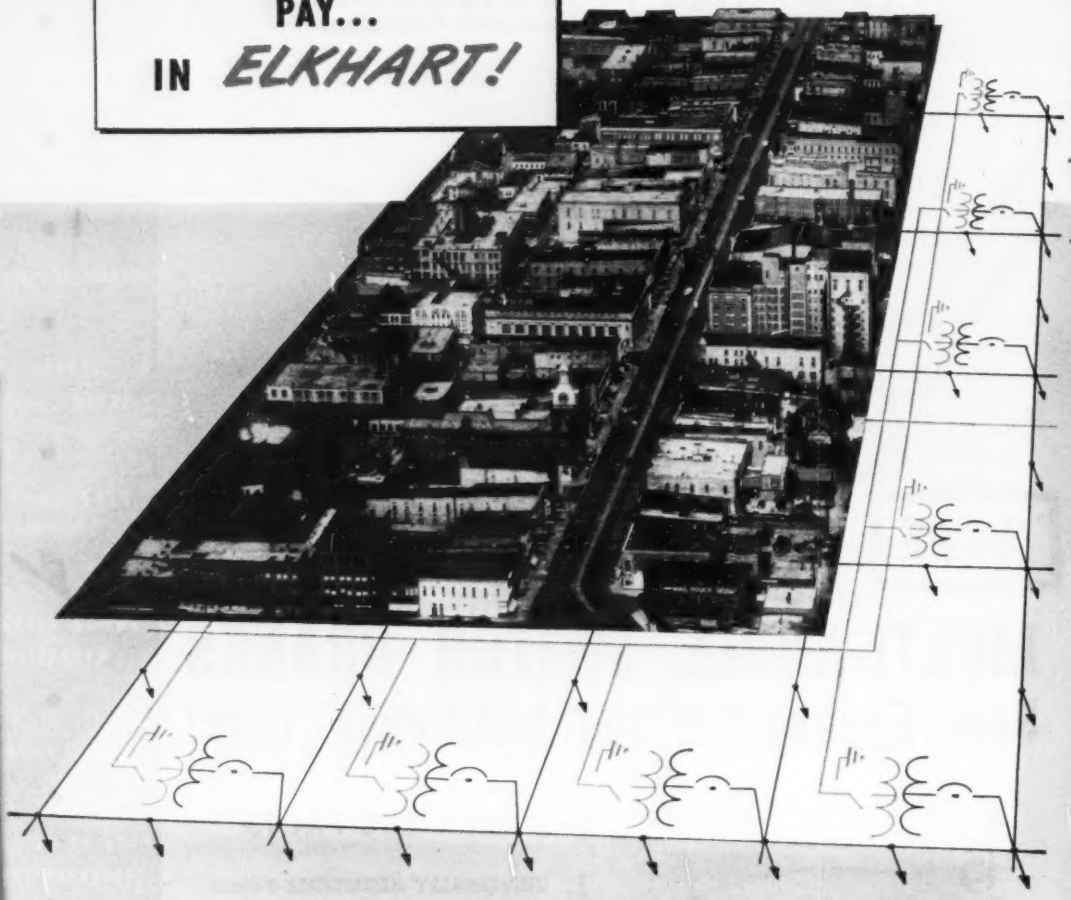
4. **MORE DETAIL** found in Bulletin 1405B. Send for your copy.

RAILWAY and INDUSTRIAL ENGINEERING CO., Greensburg, Pa.
IN CANADA—EASTERN POWER DEVICES LIMITED, TORONTO
AN I-T-E SUBSIDIARY

The Check List

- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- DISTRIBUTION EQUIPMENT
- SWITCH OPERATING MECHANISMS
- SUBSTATIONS
- OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSES
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SWITCHING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICES

NETWORK SYSTEMS PAY... IN *ELKHART!*

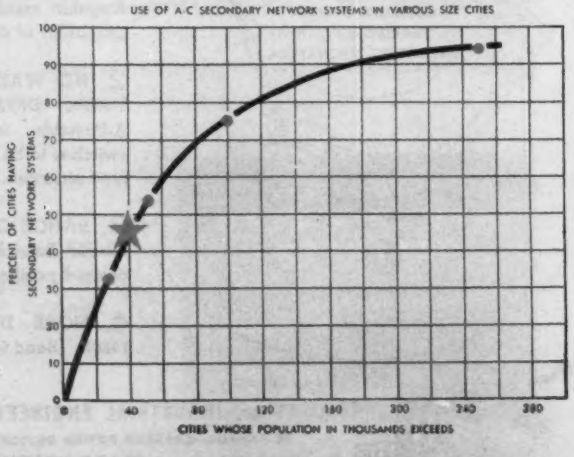


FACTS ABOUT ELKHART'S A-C SECONDARY NETWORK SYSTEM.

The secondary network system is supplied from 13 vaults having a total capacity of 3,900 kva. The area covered by Elkhart's network is almost 20 square blocks, containing 3.61 miles of conduit, 5.47 miles of primaries and 2.27 miles of secondary feeders.

•

One third of all cities in the United States with a population of 25,000 or more have network systems, while one half of all cities with a population of 50,000 or more have network systems.



17 years' uninterrupted service... no voltage-regulation problems

There's no power service problem in the business district of this bustling Indiana town of 40,000 . . . they took care of that 17 years ago. Then, Elkhart was struggling with an overloaded radial system, consisting of 3-phase primaries and both 3-phase and single-phase secondaries . . . tranformers were mounted on practically every pole. The Fire Department and fire underwriters were concerned . . . the utility was plagued with voltage-regulation problems.

OVER AND UNDER . . . In 1934 the Indiana and Michigan Electric Company met the problems of Elkhart's business district by installing an *A-C Secondary Network System.* Transformers and primaries were placed underground . . . the secondaries and services overhead. This overhead and underground combination, particularly applicable to smaller cities and towns, made possible great economy in the original installation cost.

IMPROVED SERVICE . . . The A-C Secondary Network System has resulted in a high standard of continuity of service and uniformly good voltage-regulation, not attainable through radial distribution systems. Underground placement of the primaries and transformers has greatly reduced congestion and improved appearance.

ABOUT MAINTENANCE . . . Maintenance story here is typical of all users of secondary networks . . . it's low, almost negligible. The utility reports that in 17 years of operation, there has never been a complete interruption of the system. Underground crews like the convenience of maintaining the system. They know . . . they work with the equipment.

CUSTOMERS AND UTILITIES BENEFIT . . . Utility customers appreciate the high-quality service and uniformly good voltage-regulation afforded by network service. The utility benefits from reduced operating and maintenance expense and improved customer good will. Large or small, your town can have high-quality network service . . . at a cost commensurate with the benefits this service affords. Westinghouse makes this equipment and can help in your planning. Call or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-97155

YOU CAN BE SURE.. IF IT'S

Westinghouse

NETWORK EQUIPMENT

Amcreco CREOSOTED poles

POLES • PLANKING
CROSSARMS
CONDUIT

The high initial strength of Amcreco Creosoted poles remains practically constant throughout the long life of the pole.

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INCORPORATED

COLONIAL CREOSOTING COMPANY
INCORPORATED

AMCREO

GEORGIA CREOSOTING COMPANY
INCORPORATED

ADDRESS INQUIRIES TO CHICAGO, ILL., OR LOUISVILLE, KY.

Preferred for Panel Mountings—

K&M EBONIZED ASBESTOS

K&M Ebonized Asbestos used by Electric Machinery Mfg. Company, Minneapolis, for both the relay and contactor panels of this E-M Rubber Mill Control for two 150 H.P., 720 rpm, 550-volt, 0.8 power factor synchronous motors.

Provides these wanted qualities:

- **HIGH MECHANICAL STRENGTH**
- **EXCEPTIONAL DIELECTRIC STRENGTH**
- **RELATIVELY LIGHT WEIGHT**
- **EASY TO CUT AND DRILL**
- **APPEARANCE THAT HELPS SELL**

Whether for a large control panel, or as a mount for a small component unit, electrical manufacturers and contractors everywhere are finding K&M Ebonized Asbestos the ideal electrical insulating material. Ideal, because it's easy to work . . . has the required physical and electrical characteristics . . . and provides a finished appearance that customers take pride in!

Compounded of asbestos fibers and binding cement, pressure molded to high density, and impregnated with a special insulating compound, K&M Ebonized Asbestos is available in sheets 42″ x 96″ from ⅛″ to 4″ thick and in sheets 48″ x 96″ in thicknesses from ¼″ to 2″. It may also be ordered cut to specific sizes, with edges beveled if desired.

To learn just how you can benefit by using K&M Ebonized Asbestos for panel mounting, test tables, bus bar runs, switchgear compartment linings, and other applications, write us today.

Nature made Asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON COMPANY • AMBLER • PENNSYLVANIA

In Canada: ATLAS ASBESTOS CO., LTD., MONTREAL, TORONTO, WINNIPEG, VANCOUVER

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

From Substation to Secondaries...

COMPLETELY MECHANICAL SYSTEM PROTECTION

...for lower, long-term distribution costs!

In this case, "mechanical" means a *fuseless* protective system... and one which promises many long-term, cost-saving advantages for rural and suburban lines. Specifically, it's a system which eliminates fuse replacement costs; which stays in proper co-ordination *permanently;* which simplifies the job of re-energizing faulted lines.

Its basic elements are those pictured above. The new Westinghouse GRS Sectionalizer, which is used in place of fuses, is its key component. Co-ordinated with substation reclosers, line reclosers and CSP Transformers, the sectionalizer permits—for the first time—attainment of a completely automatic, mechanical protective system... a *sure* way to gain this important objective:

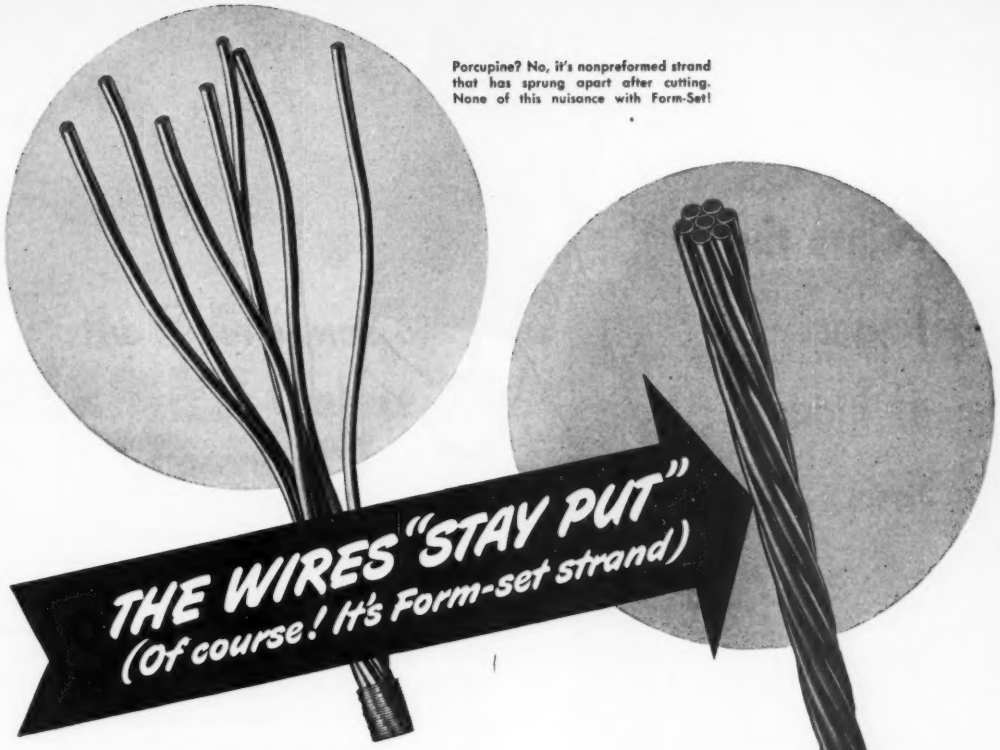
The highest degree of service continuity at the lowest long-term cost!

The mechanical protective system is one of those analyzed in Booklet B-4700, which covers advantages, limitations and cost considerations of all types of protective schemes for rural and suburban lines. For your copy of this practical guide to better protection planning, write: Westinghouse Electric Corp., P.O. Box 868, Pittsburgh30, Pa.

J-60738

Westinghouse

DISTRIBUTION APPARATUS



Porcupine? No, it's nonpreformed strand that has sprung apart after cutting. None of this nuisance with Form-Set!

There you have the big difference between Bethlehem Form-Set (preformed) strand and the conventional nonpreformed type. When Form-Set is cut, the wires stay just as they were . . . stay put. There's no unraveling; no separation. No seizing is needed.

In contrast, when nonpreformed strand has been cut, it often resembles a porcupine's quills — especially when the grade is high-strength or extra-high. Naturally, it requires seizing — a time-waster.

Form-Set, being so much easier to handle, is always a "friendly" strand. There's nothing balky or stubborn about it. Try cutting a piece; slip it into a fitting. It slides in just as quickly and easily as a pencil would.

How about cost? Do you have to pay more? Very *little* more; in fact, the difference is so minor that your budget will hardly feel it.

If you aren't yet acquainted with Form-Set, order a couple of reels of this preformed strand and ask your linemen to try it. Later on, get their opinion. We're willing to stand on what they tell you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Bethlehem *FORM-SET* Strand

BETHLEHEM STEEL

Points the finger at hidden fires . . .

Slow-burning fires may smolder for hours before they generate enough heat to set off fire detecting devices. But they can be spotted within a few seconds by a *Kidde* smoke detecting system.

A single *Kidde* Multi-line Smoke Detector System can protect one room or many rooms in the same building. A central electronic control board tells the exact location of the fire—and transmits a warning to your fire control headquarters or the local fire department.

You can combine this efficient *Kidde* Smoke Detector System with a *Kidde* CO_2 Fire Extinguishing System. See your nearest Kidde representative or write for full information.

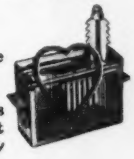
Kidde

Walter Kidde & Company, Inc., 630 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada, Limited, Montreal, P. Q.

Our Customers were right

the Performance of ELEMEX Capacitors Proves it!

When L-M engineers started designing capacitors, about ten years ago, they worked closely with utility engineers to learn what customers needed in capacitor design and performance. ELEMEX capacitors were *designed* to meet customers' needs. Now ELEMEX capacitors have been improved to serve those needs even better. Here are some of the features—some of the "extras" that ELEMEX capacitors give you!



1. Longer Life: low insulation unit stress on the pack—the heart of the capacitor.

2. Stronger solder-sealed bushings. It takes about 1900 pounds to force an L-M bushing out of the cover. Bushings are tested 100%—*every* bushing!

3. Pure aluminum electrodes—not just tinned copper.

4. Easy installation—with uniform terminal height above mounting flanges; "Paragroove" connectors simplify hookup.

5. Low-cost maintenance: L-M introduced stainless steel tanks, will continue to produce them as long as possible. Mild steel tanks have *three* coats of enamel *baked on* individually, not just one or two spray coats.

6. Streamlined tanks, with rounded corners for appearance and maximum resistance to corrosion. (Important in painted mild steel units).

7. Convenient packaging, in wood-reinforced cartons with protection at friction points. Cartons stamped sides and top; unit remains in the carton from finishing bench to the pole.

8. Simple, efficient switching for small or large capacitor banks. Another L-M extra.

Want to Cut Line Losses?

L-M's new EEI-NEMA...standard subway transformer gives you ROUND-WOUND construction *Plus*...

- reduced tank cross-section for smaller manholes
- cover-mounted high voltage wiping sleeves
- sidewall-mounted low voltage bushings with spade-type terminals
- sealed construction with welded cover
- gasketed handhole
- unexcelled performance—low losses; high short-time overload capacity

ORTO®—Oxidation-Resistant Transformer Oil—inhibited for longer life

L-M's Round-Wound® Subway transformers fully meet the new EEI-NEMA standards. They are now available. In addition to having the well-known advantages of L-M Round-Wound design, they take less vault space, have better sealing, offer greater ease in making connections, and have the advantage of being filled with L-M's ORTO.

Get the whole story! Ask the L-M Field Engineer for details; or write Line Material Co., Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).

31

LINE MATERIAL... Transformers

Complete Coordinated Equipment for Distribution Today

Now in Production

Quiet as a kitten

ELIMINATE NOISE AND RADIO TROUBLES ON 24.9 GR.Y/14.4 KV SYSTEMS WITH THIS L-M ROUND-WOUND TRANSFORMER

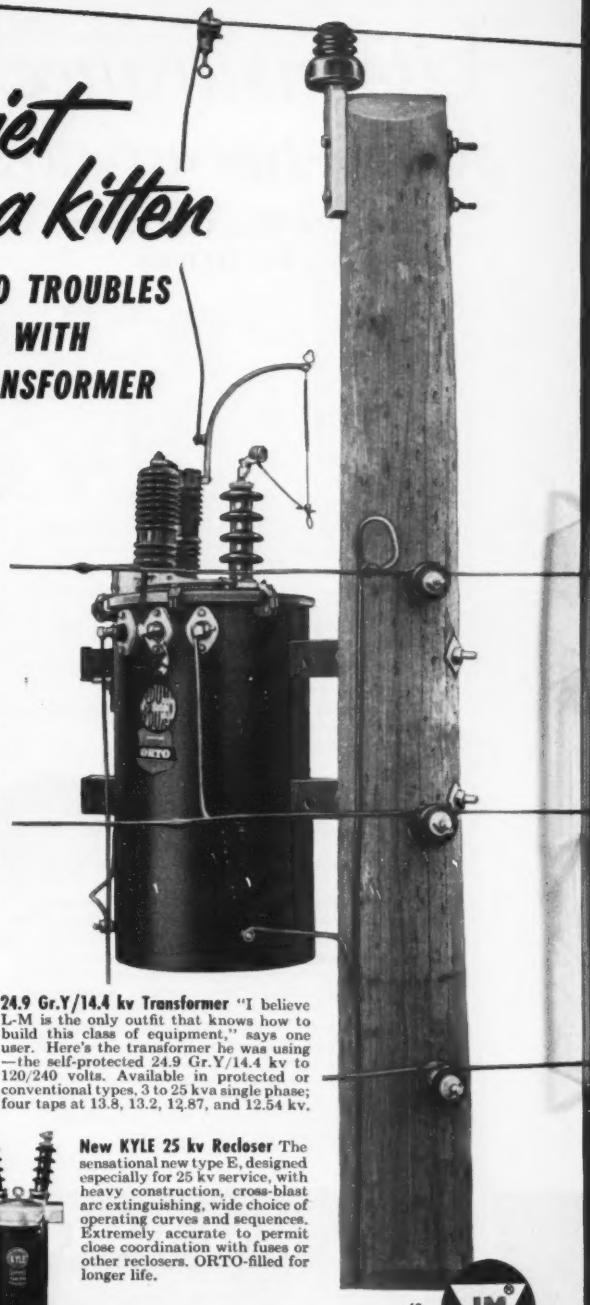
Loose cores and leaky bushings can make lots of trouble on 24.9 Gr.Y systems. Some cores get loose and hum annoyingly. The radio noise from a poorly designed bushing can drown out a distant broadcasting station—which doesn't make the neighbors happy.

L-M has built a Round-Wound® transformer especially for this service—with a core that's quiet as a whisper—it is wound from continuous strip steel, and not cut; it stays quiet!

Oil-filled bushings are specially designed and processed—they give NO radio interference.

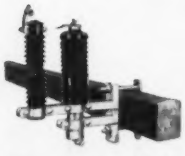
Like all Round-Wound transformers, this one has a high impulse level and high overload capacity.

The transformer and coordinated equipment have all been thoroughly tested in actual use in a number of locations throughout the country; they offer long life and dependable, economical service. Ask the L-M Field Engineer who calls on you for all the details; or write Line Material Company, Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).



24.9 Gr.Y/14.4 kv Transformer "I believe L-M is the only outfit that knows how to build this class of equipment," says one user. Here's the transformer he was using—the self-protected 24.9 Gr.Y/14.4 kv to 120/240 volts. Available in protected or conventional types, 3 to 25 kva single phase; four taps at 13.8, 13.2, 12.87, and 12.54 kv.

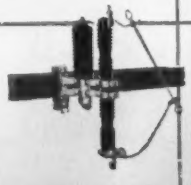
COMPLETE COORDINATED EQUIPMENT FOR 24.9 GR.Y/14.4 KV SYSTEMS



Heavy Duty Expulsion Arrester Type PF-3, 18 kv with 65,000 amp surge capacity, gives dependable protection to transformer and system.

New 24.9 Gr.Y/14.4 kv Cutout Swivel type hanger; double entrance contacts permit fusing from either side. Silver-plated solid phosnic bronze spring and contact assembly—no steel core to nick and rust!

New KYLE 25 kv Recloser The sensational new type E, designed especially for 25 kv service, with heavy construction, cross-blast arc extinguishing, wide choice of operating curves and sequences. Extremely accurate to permit close coordination with fuses or other reclosers. ORTO-filled for longer life.



Combination Arrester and Cutout Choice of swivel hanger for crossarm mounting, shown here; or for transformer mounting (shown on transformer above), top can be rotated to assure vertical fuse mounting on any size or make transformer regardless of tank diameter.

49

LINE MATERIAL

—Transformers

Complete Coordinated Equipment for Distribution Today

Life Insurance
for line-type arresters

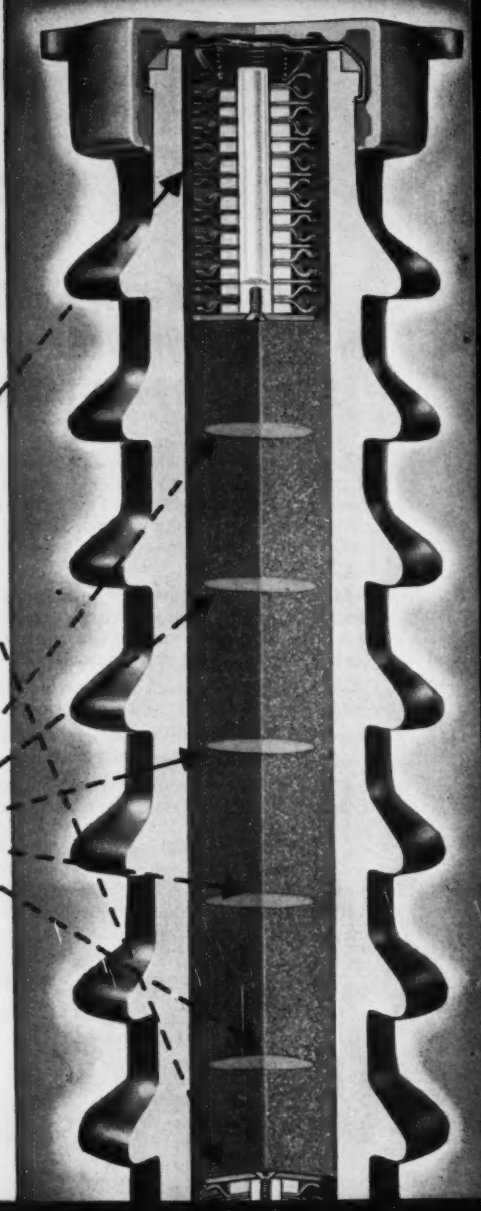
WE'VE MADE THEM LAST LONGER WITH THESE L-M FEATURES

Capacitance type spark gap maintains consistently low sparkover

Accurately shaped heavy alloy disc electrodes help assure uniform sparkover. These discs are separated by special ceramic spacers with silvered faces. These form a simple, effective voltage divider of the capacitance type which maintains uniform voltage distribution in the gap and protects it from stray electrical fields and the effect of snow or water on the housing. The ceramic spacers have a dielectric constant about 400 times that of the usual ceramic spacers. Dividing the gap into two short sturdy sections at top and bottom of the arrester increases mechanical strength.

Lens-shaped electrodes lengthen life of characteristic element

Like alternating current in a conductor, lightning surge current tends to "skin" down the outside of the arrester valve element. This "skin effect" characteristic lowers the surge capacity of ordinary arresters because only a small portion of the valve element cross-section area is used to handle lightning current. However, in L-M's Line Type Arresters, lens-shaped metallic electrodes shorten the electrical distance down the center of the valve element just enough to counteract the skin effect. The surge discharges evenly all through the valve element—and the arrester lasts far longer. The arrester can take *more* heavy surges . . . it maintains its high discharge capacity without change for years and years.

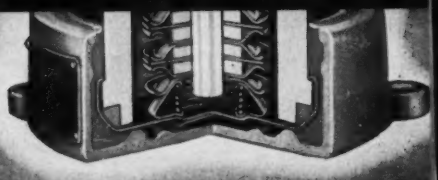


LM®

LINE MATERIAL ... Lightning Arresters

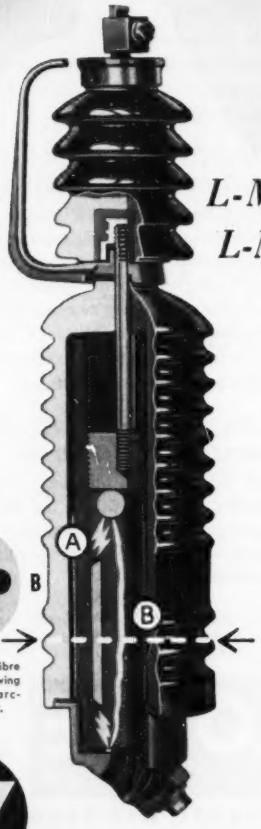
Complete Coordinated Equipment for Distribution Today

L-M type DL Line Type Arresters are available in 8 sizes from 20 to 73 kv, are heavily built, have many features to assure adequate protection with unchanging characteristics for a long, long time. Get Bulletin LA4; it gives you the whole story. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



This wedge blows out the arc

How L-M's arc-switching principle makes L-M expulsion arresters LAST LONGER!

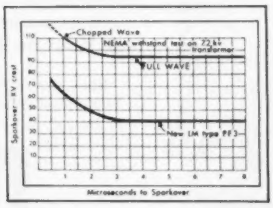


Cross section of fibre arcing plug, showing wedge-shape arc-switching chamber.

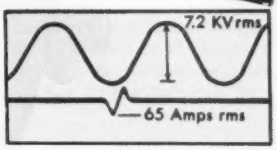
When a surge sparks over in an L-M type PF3 lightning arrester, the arc first jumps the short gaps at *A* (in the cutaway view). Since the arc is in the narrowest part of the wedge-shaped arcing chamber, gas instantly forces the arc over into a long, thin shape at *B*—then blows it out the bottom vent. Fast and sure, it operates in half a cycle or less.

The arc barely touches the electrodes before it's over and out. It doesn't last long enough to burn electrodes or fibre, so the arrester has a long, dependable, trouble-free life.

Better get the whole story from your L-M Field Engineer. Or write for Bulletin LA-3—address Line Material Company, Protective Equipment Division, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



New lower sparkover level of the 9 kv type PF3 compared with the NEMA minimum standard impulse strength of a 7200 volt transformer. (Other ratings show comparable margins of safety.)



Here a 35000 ampere surge was put on a 7200 volt line with 1200 amp fault current capacity. Because of gas pressure built up by this high surge, the arrester drew only 65 amps follow current, and cut that off in 1/10th cycle. The PF3 also amply meets accepted NEMA standards for lightning arrester performance. Now in seven ratings—3, 6, 9, 10, 12, 15 and 18 kv.

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LINE MATERIAL... Lightning Arresters

Complete Coordinated Equipment for Distribution Today

How to Simplify YOUR INVENTORY of POLE LINE HARDWARE

The industry's ONE and ONLY guide toward simplification of Pole Line Hardware Stocks. If you don't have a copy, write today.

To simplify and reduce the kind and number of Pole Line Hardware items you carry in Inventory is a guaranteed way of helping yourself lick rising costs and material shortages.

A FEW OF THE MANY BENEFITS

You reduce over-all dollar value of inventory. You practically eliminate costly. slow-moving items. You sharply reduce storage requirements. Stores accounting and auditing are simplified.

SIMPLIFICATION MADE EASY WITH LOCKE'S RM* HANDYLOG

It's the perfect tool for men working toward simplification and standardization of Pole Line Hardware stocks. Lists ALL the standard hardware items you need. Each item is a fast mover. RM* items are regularly in production, and they're carried in stock by your Locke Regional and Distributors' Warehouse. You're therefore certain of better delivery than you are when you order specials.

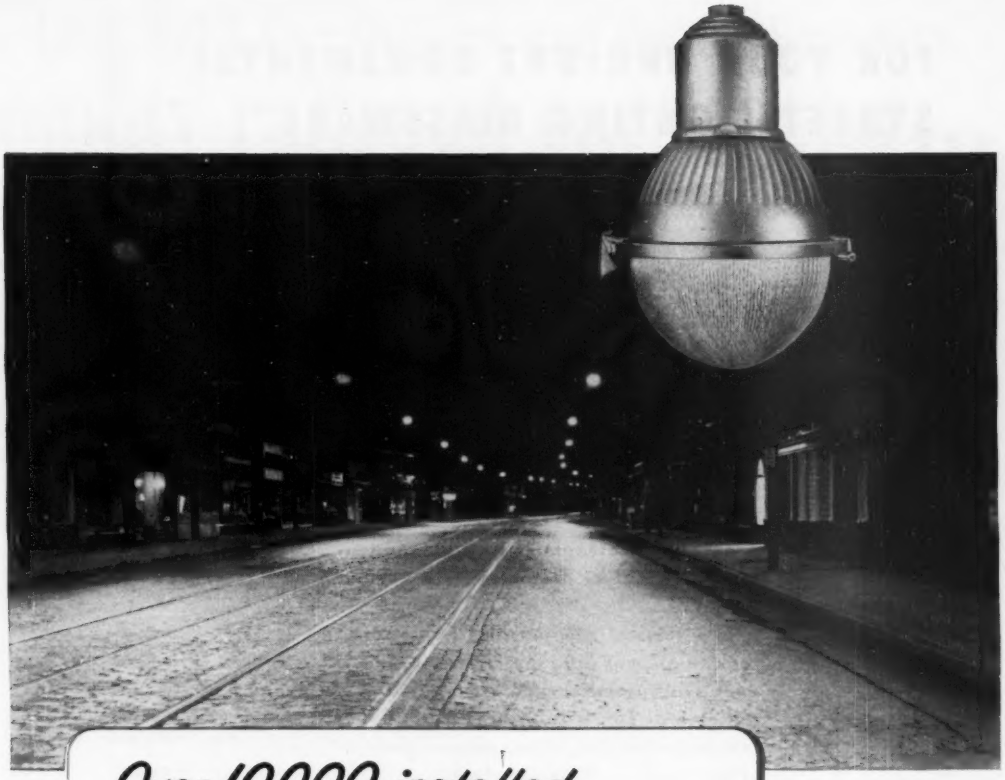
LOCKE RM* HANDYLOG ONLY GUIDE OF ITS KIND

Concentrate your planning and purchases on Locke RM* hardware items. You'll be taking the industry's only practical short cut toward fully realizing the big money-saving, time-saving benefits of simplification of Pole Line Hardware stocks.

*RM (Repetitive Manufacture) A program designed to help reduce the installed cost per kilowatt on line and station equipment.

LOCKE
INCORPORATED
BALTIMORE, MARYLAND

Before you buy stop! **See what Locke's Got!**



Over 10,000 installed in one city... **for good reason!**

Installing a good street lighting system is only part of the job. Equally important is the maintenance of that system. For example, Cleveland gets these maintenance advantages by using the AK-10!

1. They save time on routine washing and relamping because of the automatic latch-on device. Maintenance is a speedy one-man operation.
2. They get longer reflector life because this is the heaviest aluminum reflector of any unit of its type available today. This provides greater mechanical strength and a better reflecting surface.
3. They get better maintained lumen efficiency throughout the life of the lamp, because this unit is 25% larger than other units and, therefore, has a lower operating temperature.

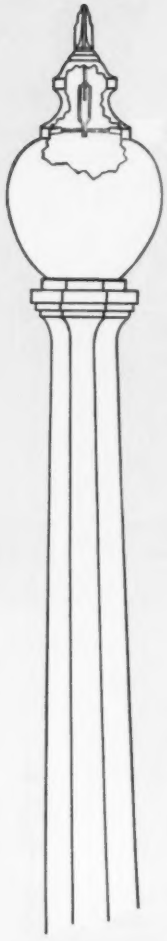
Check the standardized line of interchangeable street lighting units available at Westinghouse. Send today for B-4237, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE... IF IT'S
Westinghouse
LIGHTING DIVISION
Edgewater Park, Cleveland

J-04301

FOR YOUR UPRIGHT ORNAMENTAL STREET LIGHTING GLASSWARE

Catalog No. J95300



The JOSLYN Canopy Holder and Finial provides an ideal method for attaching glass canopies to Ornamental Glass Globes.

A most popular accessory used in hundreds of cities throughout the country.

Accommodates globes having top opening 8" to 11" in diameter with various canopies.

The vertical rod permits adjustment for canopies of different heights.

The compression springs on horizontal rod provide for installation without special tools. Bracket fingers provide positive attachment to flange of globe.

Metal finial has felt-gasketed seating surface to insure tight fit when secured in position.

Replacement Ornamental Glassware

We can make prompt delivery on all standard globes and canopies to fit ornamental street lighting standards. Complete listing of dimensions and catalog numbers will be found in our latest catalog No. 16—send for a copy today.

Catalog Nos. J94274 Canopy And J95274 Globe

Catalog Nos. J94266 Canopy And J95265 Globe

THE JOSLYN CO.
THE SOUTH EAST JOSLYN CO.
SOUTHERN JOSLYN CO.
JOSLYN SOUTHWEST CO.
JOSLYN PACIFIC CO.

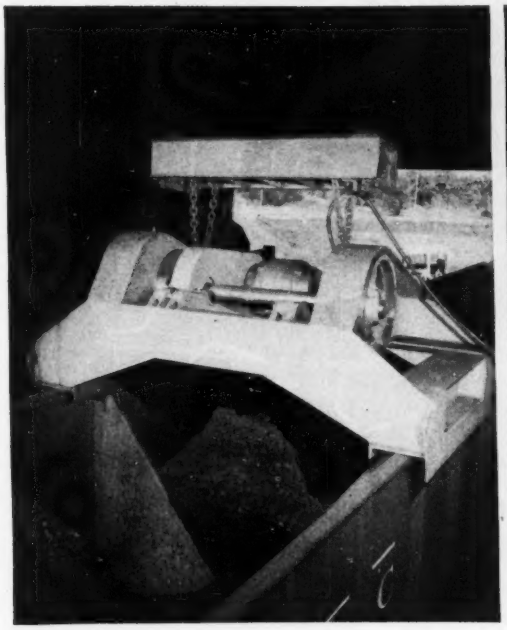
JOSLYN

Complete Pole Line Equipment

20 NORTH WACKER DRIVE, CHICAGO 6, ILL.

G. AND
PPLY CO.

LINK-BELT Car Shakers and Rotary Dumpers
empty railroad cars faster...
...more gently...at lower cost



IT'S EASIER ON CARS... thanks to exclusive low-frequency vibration. And the Link-Belt Car Shaker also has a much lower noise level. Positive action gets most hopper bottom cars "broom-clean" in a few minutes. Especially good for damp, sticky materials. Write for Book 2345.

UNLOADS GONDOLAS IN 90 SECONDS or less (including return to upright position)! Simple, automatic, fool-proof—Link-Belt Rotary Car Dumper can be operated by unskilled labor. Takes all types of open top cars... up to 90-ton capacity.

Get an unbiased recommendation for the right type of car unloader for your needs

Whether you empty a few gondola cars a day or hundreds—Link-Belt has equipment designed to do the job with maximum efficiency. Shortages of manpower, demands for ever-increasing production—both emphasize the necessity for mechanized, push-button car unloading.

Link-Belt's low-frequency Car Shaker meets the needs of smaller users. While for larger operations, Link-Belt's automatic Rotary Car Dumper offers tremendous capacity. Both are engineered by the leader in materials handling . . . each does a better, more economical job, faster, for your particular requirements.

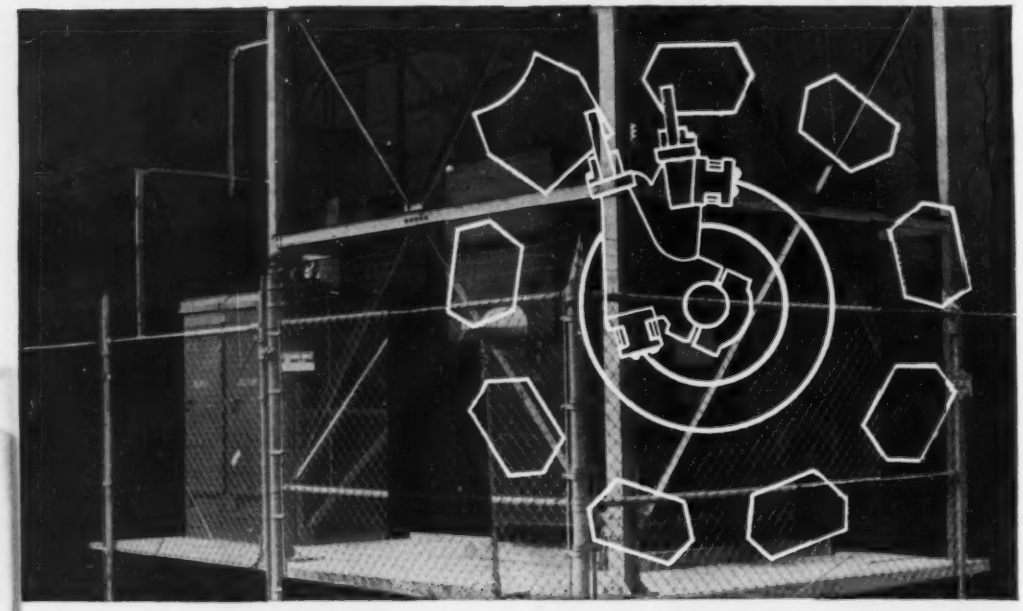
LINK-BELT

CAR SHAKERS and ROTARY DUMPERS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities. 12,320

ELIMINATE ALL ARCING

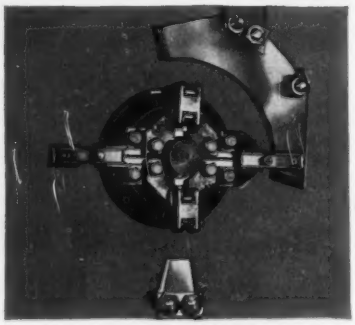
ON TAP SELECTOR SWITCH CONTACTS WITH . . .



. . . MOLONEY LOAD TAP CHANGERS PROVIDED ON FEEDER VOLTAGE REGULATORS, REGULATING TRANSFORMERS, LOAD RATIO CONTROL TRANSFORMERS

All Moloney Feeder Voltage Regulators, Regulating Transformers and Load Ratio Control Transformers are provided with Load Tap Changers which feature a load transfer switch to relieve the tap selector switch of all arcing duties. The load transfer switch has only four stationary contact tips per phase as compared with eighteen on the tap selector switch. This arrangement not only reduces the number of contacts subject to arc erosion, but also permits longer arc clearances to assure positive break of the arc. Liberal clearances of current carrying parts result in maximum capacity of the regulating equipment with minimum physical size. The load transfer switch, which is the only switch required to transfer load current, is provided with accelerating springs and is driven by Geneva gears. This assures quick break of the arc.

This is but one of the many features of the Moloney Load Tap Changer. This same sound basic construction is found in the regulating apparatus on which the tap changer is used.



Liberal clearances prevent establishment of an arc between adjacent current carrying contacts of the load transfer switch. Special alloy arcing tips prevent damage to the switch contacts as they are opened or closed.

MEET-10

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

Editorials

A New Word for Capitalism

In the ideological battle going on in the world today we are constantly confronted with the problem of defending "capitalism." This defense is not required because we lack faith in our system. It must be defended because the Communists and Socialists constantly attack it. Such an attack is successful to some degree because of a lack of understanding of the essentiality of this system in providing our standard of living and security.

William I. Nichols, editor of "This Week" magazine, thinks that a redefinition of the word "capitalism" could help change history. Nichols points out that in the early days of capitalism the name became associated with the exploitation of labor and financial profiteering at the expense of the little fellow. But, Nichols continues, it was under the capitalistic system that we abolished slavery, ended exploitation of the labor of women and children, reduced hours of work, increased the standard of living, reduced unemployment to the vanishing point, eliminated adulteration and misbranding of products, improved health and safety of workers, developed the importance of good public relations, improved living conditions, and reduced colonial rule.

These things were done by the combined efforts of management, labor, and government under the system under which we now live. Today's great strides toward mobilization are likewise being made possible through the efforts of a strong industry developed under the capitalistic system.

But in spite of all these valuable gains it is difficult to satisfy the Communists and Socialists that all this is directly related to the economic system under which we operate.

The average European "judges our capitalism in the light of what he knows about his own, and we have allowed him to remain in profound ignorance of the differences between the two," according to a French-American writer, Lewis Galantiere. Nichols thinks that "a new name for our system would help make the distinction clear." He lists as new names to consider: New Capitalism, Democratic Capitalism, Economic Democracy, Industrial Democracy, Distributism, Mutualism, and Productivism. In the end he asks "This Week's" readers to send in their suggestions.

We believe that William Nichols is doing a great service to America not only by calling attention to this matter but by causing Americans to think about a new name for this great system under which they live and prosper.

Let us all join in this search for a new word for "capitalism."

Gas Turbines Are Moving

Keep your eye on the gas turbine. It has really begun to move as indicated by recent commitments. One manufacturer will build 50 this year, another moves into the higher ratings. Reasons for the sudden awakening are not hard to see despite the present relatively high cost per kilowatt of the units in comparison with equivalent steam turbogenerators.

In some instances very little figuring is required to reveal the economic merit of the gas turbine under present demands for mobilization power. In others the advantage may not be so evident until prospective costs are compared.

Much hinges on system configuration, lengths of transmission radials, spotting of new lumps of load, power plant site locations, cost of new steam plants, cost of transmission, and cost of fuel. But all of these combined in one recent commitment to point directly to the gas turbine as the only logical answer. For one thing, transmission through well-populated areas is getting to be expensive—the old figures of $18,000 to $25,000 per mile no longer hold. Similarly power plant sites on tidewater are becoming harder to find and acquire. Add these together in per-kilowatt terms, and the sum easily exceeds the cost of buying and housing gas turbines of the ratings now available. If the added chunk of load at the end of long, tenuous transmission is sizable, the evident answer is the gas turbine.

Thus, it is not only in the areas where oil and natural gas have long been available that the gas turbine is appropriate. New England—where all fuel has to be brought in—is going gas turbine and presumably for the reasons cited. Any skeptics in intervening territory might add for their own conviction the point that the gas turbine is not exactly as portable as a unit substation but nearly so. Thus, if circumstances change as to new loads and new system sources, the cost of transferring a gas turbine to some more useful place would not be prohibitive. It is in effect proving to be a new tool for flexible expansion.

Project Pole Requirements

Extension of both power and telephone lines into rural areas along with expansion of urban areas has created a sharp rise in demand for 35 and 40-ft poles. The demand has been so great that the proportion of poles of those two lengths has doubled their percentage of the total. This unbalance has had an effect on the cuttings and the saving of some of these intermediate heights for growth into taller pole material.

If the pole-using utilities want to be assured of an adequate supply of poles for the years ahead a dependable long-range forecast of foreseeable needs should be compiled. Trees do not attain the desired heights over night; in fact, it takes about as long to grow a pole as it does for one to decay to the point of replacement. Poles for 1981 replacement ought to be planted in 1951. The taller ones needed then should be more than saplings even now.

Pole demand is likely to approach 9 million per year. Three out of four have usually been Southern yellow pine. Something like 40,000 acres of first class growth-managed forest lands will have to be administered to meet the demand. Allowing for average management and production, the acreage could easily have to be 50,000 or more. Whether that many are forested or reforested is very likely to depend on the foreseen market many years hence, and that is why the demands that far ahead should be estimated now.

Another way of relieving a possible shortage is to reexamine the specifications and construction configuration, particularly for joint use with other wire-using utilities. Here and there requirements may be discovered which could perhaps be tempered so as to permit the use of shorter or lower class poles. Still another method of stretching the life of existing poles could be to salvage cedar poles by removing decayed sapwood and dipping the cleaned butts in preservative.

Metals can be mined the year they are to be needed, but timber has to be grown a couple of decades in advance.

Fish and Dams?

Recent liberal modifications by Portland General Electric of the original provisions for caring for fish life at the proposed Pelton hydroelectric project on the Deschutes river in eastern Oregon warrant careful consideration and an early favorable recommendation by the Department of the Interior. The fish and wildlife people have everything to gain and nothing to lose by approving the project, which would give them a chance to try to develop under nearly ideal conditions a salmon run where none has existed—and at the expense of the utility, not the taxpayer.

In brief, PGE has offered to spend $3 million to build a regulating dam below the power plant, plus $1 million for hatcheries, holding ponds, and other facilities to handle the fish, and $100,000 annually for their operation. All this on a stream which in the best memory of the old-timers of the area has never had a salmon run above the proposed site of the dam. Nature has led the salmon that do come up the stream into the Warm Springs river, a lower tributary well downstream from the power site.

More and more in these days of need for rapidly expanding generating capacity, should some constructive effort be made to determine what can be done to preserve our fish without hamstringing worth-while hydroelectric projects. Prompt action by the Secretary of the Interior would enable Portland General Electric to put this new 120,000 kw of badly needed capacity on the line by the critical winter of 1952-53. At the same time it would provide some valuable experience for the fish and wildlife people in their worth while efforts to determine how we can have fish *and* dams.

The Electrical Week

INDUSTRY MOBILIZATION—Steel has been designated a "program material" for electric utility use in the third quarter (p 64) . . . NPA and DPA have opened a joint information office in Washington (p 64) . . . Present Depa controls will make it easier for the industry to make the transition to CMP (p 64) . . . Power equipment makers get their quotas of metals for the third quarter (p 64) . . . Refrigerator manufacturers oppose unit control over production (p 64).

WASHINGTON—FPC examiner recommends issuance of a one-year preliminary permit to Delaware River Development Corp to consider hydro projects on the river in New Jersey, Pennsylvania and New York (p 66) . . . Alcoa subsidiaries with dams in Tennessee and North Carolina must file with FPC for licenses to continue operating them (p 70) . . . Interior Secretary Chapman opposes private project near Hells Canyon (p 73).

ELSEWHERE—Cleveland Electric Illuminating Co says it has the best location in the nation (p 65) . . . PUAA presents awards in 1951 Better Copy Contest (p 67) . . . A rate increase may protect the customers by attracting investors, security analyst says at PCEA convention (p 68) . . . There's nothing wrong with the economy that vigorous selling won't cure, NAED convention hears (p 70) . . . Governor Scott of North Carolina requests State Utilities Commission to investigate power situation there (p 71).

• • •

Based on the March rate of consumption, utilities had enough coal on hand April 1 to last 107 days. The stockpile of 31,192,914 tons was 103.6% more than the utilities had a year earlier.

Coal has regained its overwhelming dominance over fuel oil in the utility field. March coal use was 9,031,185 tons, 25.5% over the 7,195,128 tons consumed in March 1950. Fuel oil use was 5,527,472 bbl, 29.8% below the March 1950 consumption of 7,868,487 bbl.

Total capacity installed in U. S. central stations passed the 70-million-kw mark in August. As of April 1 total capacity was 70,250,298 kw. Of this 50,474,400 kw were steam, 1,921,572 kw internal combustion, and 17,854,326 kw hydro.

Of $6.3 billion in new securities offerings in the U. S. during 1950, $2,686 million, or 43%, were by electric, gas, and water companies, the Securities and Exchange Commission has estimated. Electric, gas, and water offerings were only 31% of the 1948 offerings and 38% of the 1949 total. Manufacturing companies have declined from 31% in 1948 to only 19% in 1950.

Increasing demands for electric power should be a tip-off to coal-consuming utilities to increase their coal stockpiles. The price of coal isn't likely to decrease.

Office of Price Stabilization has petitioned FPC to intervene in commission proceedings on a natural gas rate increase being sought by the Michigan-Wisconsin Pipe Line Co. OPS said the proposed increase "might have a tendency contrary to the purposes of the price stabilization program."

One person would have to eat, at a single sitting, 100 lb of Columbia River salmon caught just below the Hanford atomic energy works at Richland, Wash., to take into his body a noticeable amount of radio-active material resulting from operation of these works. Cooling water from the river is pumped through the reactors. Dissolved materials in it become "hot." Water is returned to the river, but only after its radioactivity has been reduced almost to the vanishing point.

Notes From The News

The coal-short German city of Salach is building a wind generator with a 130-ft propeller to produce 100 kw. Biggest problem of engineers working on the tower is to avoid the mistakes of American engineers who put up a huge power mill in Vermont in 1943. The thing produced 1,000 kw for three weeks and then blew apart . . . Rocks, BB guns, .22 rifles, and bows and arrows are being used by gangs of boys in Halifax, N. S. to smash street and bridge lights, Nova Scotia Light & Power Co reports. So far, police have been unable to check the epidemic. . . A water power tunnel 11,000 ft long and with a cross-sectional area of 1,750 square ft is being drilled in northern Sweden to supply the new Kilforsen power plant. Novel angle is that the tunnel will also be used to float timber, a telfer line along the roof permitting easy inspection of the logs . . . A new dam to be built at Owen Falls near one of the sources of the Nile River in Uganda will make possible production of one million kw, Egypt has announced. The output will come from six successive waterfalls, each producing more than 150,000 kw.

Steel Designated 'Program Material' for Electric Utilities in 3rd Quarter

Steel has been designated as a "program material" for electric utility use in the third quarter. At the same time, the quota for use of aluminum for minor requirements has been sharply reduced.

These actions were announced May 28 by National Production Authority in a statement which said that a new, amended electric utilities order, M-50 amended, would be issued soon. A few days earlier, Defense Electric Power Administration which administers provisions of M-50 advised electric utilities of the proposed changes.

Depa to Authorize Steel Use

As a "program material," steel for electric utility use will be authorized by Depa rather than NPA. Previously, NPA approval of use of more than 25 tons of steel was required. NPA, however, must still approve steel use by electric utilities for construction of office buildings and other structures not associated with actual power facilities.

Steel for electric utilities is divided into three categories: stainless, alloy, and carbon. As with present program materials, copper and aluminum, utilities are given a choice between two methods of calculating minor requirement quotas. For each of three types of steel, the standard quota for the third quarter will be 18.75% of the 1950 total quantity used. The alternative quota will be 75% of the third quarter, 1950, usage.

Separate Calculations Ordered

Depa and NPA emphasized that quotas for the three types of steel must be calculated separately and may not be combined.

Aluminum for minor requirements in the third quarter will be either 12.5% of the 1950 use or 50% of the amount used in the third quarter of 1950. This compares with either 20% of the 1950 total or 80% of the second quarter, 1950, usage, which was prescribed for the second quarter of this year.

Minor requirements quotas for copper will continue to be figured on a similar basis in the third quarter as for the current quarter: Standard quota, 18.75% of 1950 total; or alternative quota, 75% of third quarter, 1950.

Depa has warned electric utilities that orders for delivery in July must have been placed by May 31.

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Joint Information Office Opened by NPA and DPA

National Production Authority and the Defense Production Administration have opened a defense inquiry center in Washington. Its purpose is to make defense information readily available to businessmen or their representatives in Washington. Businessmen in other areas will continue to get information from field offices of the Department of Commerce.

The new information center is in the main lobby of the Old General Accounting Office at Fifth and G Streets, NW, close to the Union Station.

Two staffs are available. One will answer routine questions and direct inquiries to information specialists. The other, consisting of industry experts, will supply information on specialized problems. When necessary appointments will be arranged with NPA or DPA operating officials who can provide particularized data. A complete file of orders, regulations, forms, and publications is maintained.

T. FOLEY TREADWAY, on leave from the Southern Engineering Co, Atlanta, is serving as a consultant to Depa

Depa Program Gives It Head Start over CMP

Defense Electric Power Administration has a "head start" toward a controlled materials plan which will "render the transition to CMP much easier than would otherwise have been the case," a Depa official predicted last week.

Chandler W. Jones, president of the Northampton (Mass.) Electric Lighting Co and a Depa consultant, spoke to the Pacific Coast Electrical Association in Los Angeles May 19. He explained that Depa's second quarter materials allotments virtually placed the agency under a controlled materials program in advance of the July 1 date for a general CMP.

Jones, who served in the War Production Board during the last war, praised CMP. "We know that it worked well in World War II; we expect it to operate satisfactorily again," he declared.

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Power Equipment Makers Get 3rd Q Metal Quotas

Defense Production Administration has allocated materials for heavy power equipment production in the third quarter as follows: steel, 240,000 tons; aluminum, 3.8 million lb; and copper, 37.8 million lb.

As reported by "Electrical World" (May 28, p 4), these allocations represent a 35% cut in aluminum under estimated total requirements for the quarter and 30% less copper and 15% less steel.

DO's are being issued to power equipment manufacturers for these materials by the Engine and Turbine Division of the National Production Authority.

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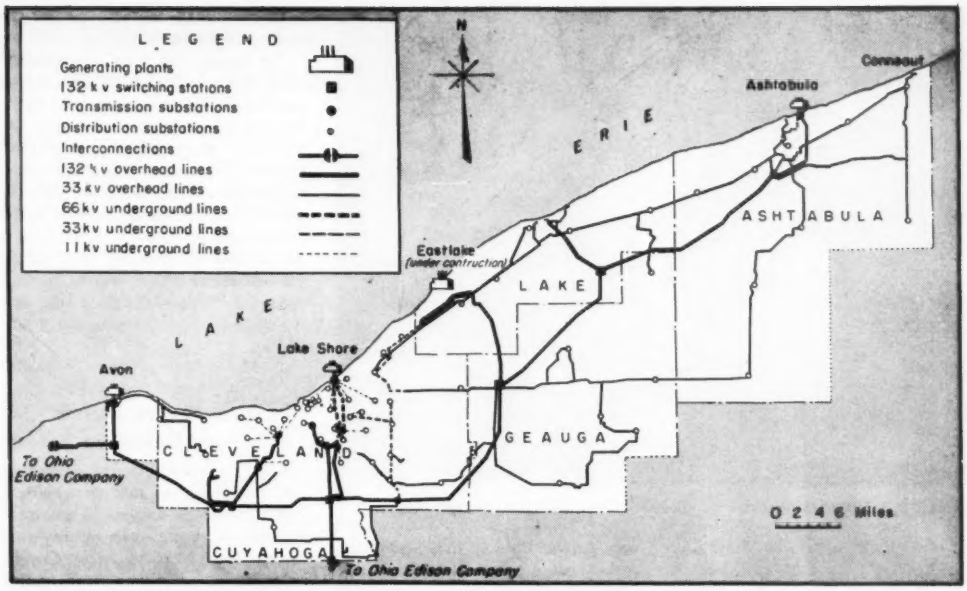
Opposition to Unit Control

Refrigerator makers don't want unit control over production, their Advisory Committee told National Production Authority. Unit control would prohibit manufacturers from making more than a set number of items in a product line. It has been proposed as a substitute for the present control method over consumer durables, which merely limits manufacturers to a percentage of the scarce materials they used in a base period.



BEST LOCATION IN THE NATION is the way Cleveland Electric Illuminating Co describes this territory which it serves

Utility Boosts Cleveland Area as Best

CEI Uses Nationwide Advertising Campaign to Attract Industries, Proves Success with Growing Load, Greater Sales, More Customers

The best location in the nation!

When an electric utility says that, it can be considered excusable bragging. But Cleveland Electric Illuminating Co has been saying that in print for the past seven years. The Ohio utility even refuses to admit any degree of exaggeration. Instead it calls the slogan the truth and good business. In proof company officials merely point to the many industries which are coming to its service area.

These new industries naturally will get their power from CEI; so its industrial sales and load will soar. In 1946 CEI's estimated industrial load was 542,100 kw. At the end of 1950 this had increased to 642,500 kw. But this is only the beginning. Much bigger loads are on their way.

At Ashtabula the National Distillers plant has a load of 25,000 kw and may eventually need 60,000 kw. Other new plants with their eventual loads are the Ford engine plant, just outside of Cleveland, 20,000 kw; the Chevrolet plant in Brookpark, another Cleveland suburb, 13,000 kw; and the General Motors tank plant at Cleveland's airport, 13,000 kw. Republic Steel Corp and Jones & Laughlin Steel Corp are also down on the books for sizable blocks of power.

Perhaps the best man to tell about the company's attitude toward industrial load building is the man who has been behind the plan to encourage industry to the area, Elmer L. Lindseth. President of the company since 1945, he has won for himself nationwide recognition as one of the industry's progressive thinkers. He added much to his stature in 1949-50 when as president of the Edison Electric Institute he spoke hundreds of times in all sections of the country. His story that year concerned not the achievements of his own company but rather those of the investor-owned companies. He also pointed out the threat of federal power to all industry and the free enterprise system.

Here is his story of Cleveland Electric's accomplishments:

"The most spectacular growths in load are possible in the industrial field, particularly in an area such as ours where 75% of the electric power goes to industrial and large commercial customers.

"Accordingly, an important segment of our sales organization is our development department. It works constantly to bring new manufacturers to our territory and to convince those here that they should stay and expand. Customers of this type insure an ever-enlarging market for our product.

"We have found new industries mean more jobs, more homes for new workers, and stores and shops to supply these workers. Factories help to pay taxes and help support many community needs. In general, industrial plants boost the prosperity and well-being of the community.

"The specific development campaign based on the theme, 'The Best Location in the Nation,' began in 1944. Our advertising and promotion followed an extensive research job during

ELMER L. LINDSETH—Booster for Cleveland, CEI, and private enterprise

which we gathered an impressive array of facts to prove that Cleveland and northeast Ohio truly have a number of superior advantages for the production and management headquarters of a great many industries.

"For seven years we have told our story through advertisements in national magazines, in newspapers, by direct mail, and by radio. Our representatives have spread the word further in countless speeches. We even made a motion picture, 'Opportunity, the Story of the Best Location in the Nation,' which was seen by 1.5 million persons.

"This advertising has brought results. Inquiries have come from every state and many foreign countries. In 1950 there were 622 inquiries traceable to 'best location' ads. One direct mail advertising piece, mailed Oct. 2 to a select group of industrial prospects, brought 31 inquiries from companies interested in acquiring some 3 million sq ft of manufacturing space in northeast Ohio.

"But advertising and publicity are only part of the job. It is still necessary to close sales. Accordingly, we offer prospects a free, confidential, complete location engineering service. Our engineers provide inquirers with a vast amount of pertinent information which any industrial concern must have before deciding to expand its operations in our area. We have also been aided by chambers of commerce, railroads, banks, newspapers, and other community-building organizations.

"As a result, in the past five years over $1 billion has been invested, or committed for investment, in industrial expansion in northeast Ohio. This figure does not even include hundreds of smaller industrial additions nor the expansion program of our own company. We alone have spent $110 million since V-J Day and plan to spend another $125 million over the next five years.

"This billion dollars, invested by just 128 large firms, amounts to more than 3% of the total national industrial expansion of the past five years—in an area containing only 1% of the nation's population."

To handle the growing industrial load along with that of commercial and residential customers, CEI has a big expansion program underway. At the Lake Shore Plant in Cleveland 150,000 kw, in two 75,000-kw units, will go on the line this year. In 1952 the first 125,000-kw unit will go on the line at Eastlake Plant, 20 miles east of downtown Cleveland. In 1953 the second and third units will be put into operation. These additions will give the system a capacity of over 1.5 million kw.

CEI Sales and Capacity Growth — 1946-1950

	1946	1947	1948	1949	1950
Installed capacity (Kw) (Capability in December)	804,000	804,000	804,000	984,000	984,000
Peak load (Kw) (Service Area)	735,000	809,300	846,000	839,000	914,000
Industrial load on our system (Kw)* (December)	542,100	603,800	652,900	562,700	642,500
Total electric sales (Kwhr)	3,024,978,836	3,703,055,462	4,122,809,120	3,767,793,988	4,004,500,843
Residential sales (Kwhr)	478,572,825	511,239,171	555,340,906	604,820,339	690,883,568
Other sales (Kwhr)	2,546,406,011	3,191,816,291	3,567,468,214	3,162,973,649	3,313,617,275

* Estimated

Examiner Recommends 1-Year Delaware Permit

Chief Examiner Frank A. Hampton has recommended that the Federal Power Commission issue a one-year preliminary permit to Delaware River Development Corp of Jersey City to investigate development of a hydroelectric project on the Delaware in New Jersey, Pennsylvania and New York.

The proposed project, estimated to cost $47-million, would include three installations with dams, forebays, and powerhouses at Chestnut Hill, Pa., Belvidere, N. J., and Tocks Island, N. Y. Total capacity would be about 211,500 kw.

The State of New Jersey, the Commonwealth of Pennsylvania and the City of Philadelphia intervened at the hearings, but Hampton said protests against the projects could only be heard at a license hearing, should the corporation make application. The permit would not give the company any priority of application over the three states and Delaware, should they choose to file within the year.

AEC Plans Expanded

The $180-million expansion program scheduled last year for the Atomic Energy Commission's plant at Hanford, Wash., will be further expanded this year by an additional $25 million. Under the former program construction work would have begun to taper off by the end of the year. With the revised schedule, construction employment will remain at the present level of 6,000 workers until at least mid-1952.

'Ten Little Free Workers' Receives Special Citation in PUAA Contest

Potomac Edison Co received a special citation in the 1951 Better Copy Contest of Public Utilities Advertising Association for its cartoon advertisement, "Ten Little Free Workers." The ad was authored by Charles D. Lyon, PEC advertising manager, and reproduced across the country.

Winners of the contest were announced at the recent PUAA convention in New York. In most classifications, entries were judged in three national groups, based on number of meters in service. Group A included utilities with 400,000 or more meters; B, more than 150,000 and less than 400,000; and C, less than 150,000.

Unless otherwise stated the companies listed in each group were winners of first, second, and third awards, respectively. Only awards won by electric or combination companies are listed.

Complete programs—A: Cincinnati G&L Co, New York State E&G Corp, Northern States Power Co; B: Dallas P&L Co, first; Wisconsin Public Service Corp, second; C: Hawaiian Electric Co, Washington Water Power Co, Iowa Electric L&P Co.

Series of three to five newspaper ads on a public relations subject—A: Union Electric Co, Cincinnati G&E Co, Southern California Edison Co; B: Wisconsin Electric Power Co, first; Dayton P&L Co, second; C: Hawaiian Electric Co, Lowell Electric Light Corp, Northern Arizona L&P Co.

Single newspaper ad on any subject—A: Boston Edison Co, first; Pacific G&E Co, second; B: Kansas City P&L Co, Connecticut L&P Co, Potomac Electric Power Co; C: Hartford Electric Light Co, Central Hudson G&E Corp, Central Arizona L&P Co.

Single newspaper ad promoting the use of electricity—A: Cincinnati G&E Co, Northern States Power Co, Consolidated Edison Co of New York, Inc; B: Kansas City P&L Co, Potomac Electric Power Co, Central P&L Co; C: Empire District Electric Co, Birmingham Electric Co, Hawaiian Electric Co.

Single newspaper ad selling electric merchandise—A: Philadelphia Electric Co, Commonwealth Edison Co, Boston Edison Co; B: Kansas City P&L Co, Wisconsin P&L Co, Wisconsin Electric Power Co; C: Iowa Electric L&P Co, Hartford Electric Light Co, New Hampshire Electric Co.

Employee magazines—A: Union Electric Co of Missouri, second; B: United Illuminating Co, Metropolitan Edison Co, Kansas City P&L Co; C: Hardford Electric Light Co, Hawaiian Electric Co, Columbus & Southern Ohio Electric Co.

Employee newspapers—A: Union Electric Co of Missouri, Public Service E&G Co, Georgia Power Co; B: West Penn Power Co, British Columbia Electric Co, Iowa P&L Co; C: Potomac Edison Co, Central Hudson G&E Corp, Iowa Electric L&P Co.

Bill enclosures, postcard billing cards, direct mail pieces, publications, and other material sent to residential customers—A: Cincinnati G&E Co, first; Northern States Power Co, second; B: Wisconsin Public Service Corp, West Penn Power Co, Connecticut L&P Co; C: Potomac Edison Co, first.

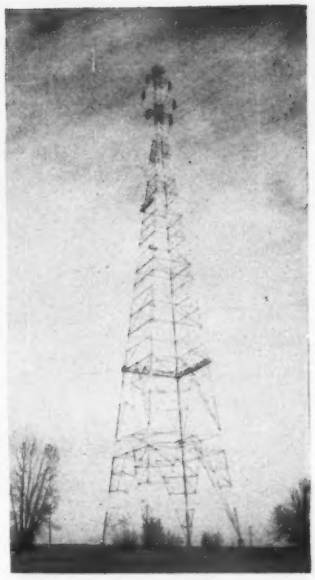
Bill enclosures, postcard billing cards, direct mail pieces, publications, and other material sent to farm, commercial or industrial customers—A: Public Service Co of Northern Illinois, Cleveland Electric Illuminating Co, Southern California Edison Co; B: British Columbia Electric Railway, West Penn Power Co, Portland General Electric Co; C: Washington Water Power Co, Potomac Edison Co, Pacific P&L Co.

Printed material used in dealer promotion on any subject—A: New York State E&G Corp, first; Detroit Edison Co, third; B: New Orleans Public Service Inc, first; Utah P&L Co, second; C: Kansas G&E Co, second; Central Hudson G&E Corp, third.

Special booklets, pamphlets, and literature other than house organs sent to employees—A: Northern States Power Co, Consolidated Edison Co of New York, Inc, Niagara Mohawk Power Corp; B: Connecticut L&P Co, Shawinigan Water & Power Co, Monongahela Power Co; C: Southwestern Public Service Co, second; Western Massachusetts Electric Co, third.

Window display—A: Cleveland Illuminating Co, second; Consolidated Edison Co of New York, Inc, third; B: Kansas City P&L Co, second; C: Empire District Electric Co, Kings County Lighting Co, Delaware P&L Co.

Interior displays—A: Ohio Edison Co, New York State E&G Corp, Consolidated Edison Co of New York, Inc; B: Indianapolis P&L Co, New Orleans Public Service Co, Inc, Pennsylvania Electric Co; C: Washington Power Co, first; Kings County Lighting Co, third.



520-FT LINE TOWER at Vancouver, Wash., and its twin across Columbia River at St. Johns, Ore., are highest in the world, according to BPA. Towers support 115-kv lines across 3,756-ft span

Car and bus cards and truck posters—A: Pacific G&E Co, Boston Edison Co, Consolidated Edison Co; B: Kansas City P&L Co, second; New Orleans Public Service Co, Inc, third; C: Iowa Electric L&P Co, third.

Outdoor advertising—A: Union Electric Co, first; Commonwealth Edison Co, second; B: Dallas P&L Co, first; New Orleans Public Service Co, Inc, third; C: Pennsylvania Power Co, first; West Texas Utilities Co, second.

Annual report to stockholders—A: Illinois Power Co, first; American G&E Co, second; B: Iowa P&L Co, Kansas City P&L Co, Puget Sound P&L Co; C: Columbus & Southern Ohio Electric Co, Minnesota P&L Co, Southwestern Public Service Co.

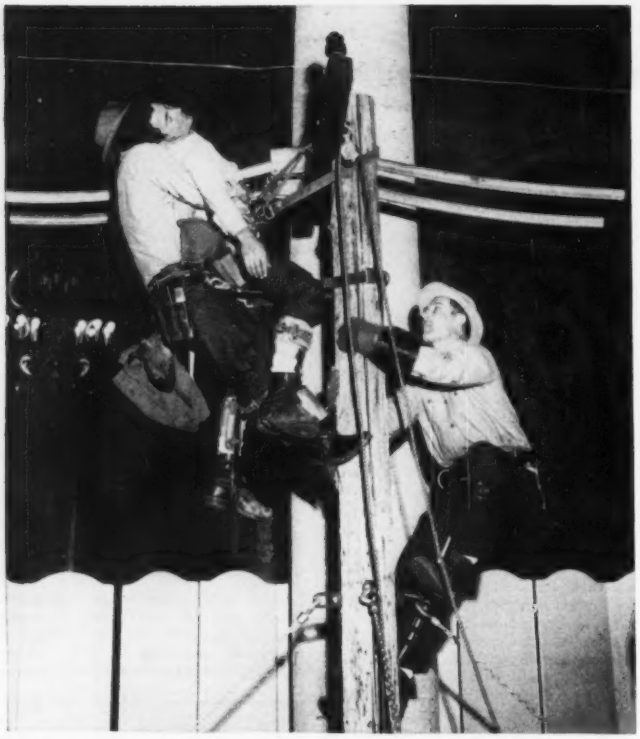
***Radio advertising**—Texas Electric Service Co, Union Electric Co, Cincinnati G&E Co.

***Motion pictures**—Pacific G&E Co, second; Kansas City P&L Co, third.

***Television**—Duquesne Light Co, third.

*All compete as one group.

Special—Potomac Edison Co for the advertisement, "Ten Little Free Workers," written in 1949 to point out to all industries and professions the dangers of nationalization.



POLE-TOP RESUSCITATION was demonstrated by line crew of Southern California Edison Co at PCEA Convention. Men used standard equipment for indoor "rescue"

Rate Rise Can Interest Investors, Protect Customers, PCEA Is Told

The position of a utility in the competition for the limited amount of investment capital available determines its ability to protect and expand electric supply vital to economic welfare of its area, according to C. A. O'Neil, Duff & Phelps, security analysts.

He spoke to more than 1,000 delegates at the annual convention of Pacific Coast Electrical Association in Los Angeles May 21-23.

"For this reason," he said, "overall interests of the customer far outweigh the small added out-of-pocket cost of a rate increase sufficient to restore earnings to a level adequate under conditions predictable during the next several years."

If there are signs the position of a utility is slipping despite efforts toward economical operation, he said, then a positive duty to the public exists for the management to restore that position by means of rate relief.

Since the federal government makes and controls money policy, it must accept the responsibility for having mothered, fed, and reared inflation during the past 20 years, said Harold Quinton, executive vice president of Southern California Edison Co. He warned that although inflation erodes the accumulated capital of all industry, its effects are more apparent in regulated industry.

Since rate of return and charges are related to original cost rather than replacement, it is impossible to replace from earnings the capital being consumed in utility operation. As an example he cited the experience of his own company, which realized a return of only 2% on $20 million of new capital invested during 1950—less than one-half the cost of acquiring such new capital.

Discussing the mobilization program, C. H. Lang, vice president of General Electric Co, predicted the demand for producers' equipment would reach a peak in 1951, that for military durables in 1953, and that for consumer durables in 1954.

Reports on Field Tests

Clyde Clevenger, Southern California Edison, reported on field tests of tie line load control to determine time delay between measuring load swings at a tie point and arrival of usable control impulses at the governor in the regulating plant up to one or two hundred miles distant. Initial deviation impulses representing at least 25% of load swings of 10, 20, 30, and 40 Mw were recorded in 5 to 6 seconds. Within 10 seconds 95% of a 20-Mw swing, 91% of a 30-Mw swing, and 76% of a 40-Mw swing were recorded.

R. E. Lake, Pacific Gas & Electric Co, said his company had less trouble with television interference than was originally expected. Field tests have shown high voltage transmission is not in itself a source of interference. In the worst location found in one series of tests field strength at 720 kc was 220 microvolts per meter, but dropped off to no measurable reading at the local television channel frequencies.

E. D. Sherwin, San Diego Gas and Electric Co, succeeded F. A. Tracy, Sierra Pacific Power Co, as PCEA president.

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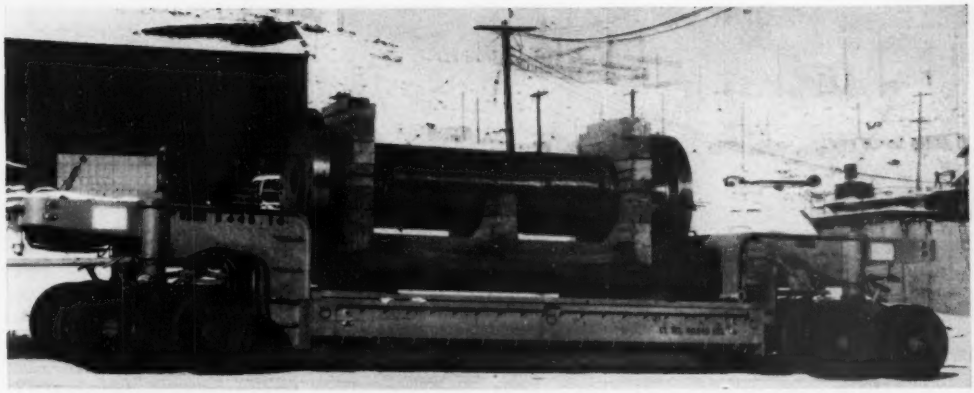
Promotion Piece Offered on Lighting, Appliances

"Dreams Come True When You Live Electrically," a promotional piece for use by electric light and power companies and appliance dealers, has been released by Edison Electric Institute.

Copy emphasizes that more leisure time is available, tasks are made easier, and home decorative effects more appealing through use of electrical appliances and lighting. The piece can be purchased from Commercial Department, Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y. Price is $5 for 100.



NEW TWO-WAY TRAILER for 100-ton loads is used by Bureau of Reclamation to haul 51-ton generator shaft to Grand Coulee Dam. With steering mechanisms at either end, 53-ft trailer can turn corners fairly sharply, using only an 18-ft radius

Court Rules on Heroism in Suit Involving Utility

The heroism of a man who was electrocuted while saving another from a downed high-tension line is given special consideration under the law, the Virginia Supreme Court of Appeals held recently.

It ruled on a suit brought against Appalachian Electric Power Co by Mrs Glenwood D. Andrews, widow of the man killed in the act of heroism to recover damages in her husband's death. "In attempting to save the life of another," the court said, "one is justified in exposing himself to danger in a manner that under other circumstances would deprive him of legal redress for injuries sustained."

The decision reversed a ruling of the Circuit Court of Pulaski County and sent the case back for a new trial. The lower court had struck all the evidence on the grounds it failed to show the power company was guilty of any negligence.

The facts in the case were these:

On July 16, 1948, a 2.4-kv line broke and fell into the street in Pulaski, Va., near the Andrews home. Homer Ryan, an electrician, grabbed the lightly insulated line and tried to pull it out of the street. The insulation peeled off, leaving his hand locked on the wire and knocking him unconscious. Andrews, who had been looking on, jerked the line loose from Ryan but was electrocuted.

The question before the higher court was this: Because he rushed into a known danger, did Andrews lose his right to recovery? Not necessarily, the Supreme Court held, adding the question of damage was a matter for a jury to decide.

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185,000-Kw Unit Ordered

Public Service Electric & Gas Co, Newark, has ordered a 185,000-kw steam turbine-generator for its Burlington station. The unit is expected to be ready for service in the summer of 1954. One of the largest steam units in the world, it will raise the station's capacity to 475,000 kw.

BPA Seeking Engineers

Howard Strawn, Bonneville Power Administration replacement officer, and E. J. Harrington, electrical engineer, have been assigned to a tour of 22 colleges in the Southwest and Midwest, in an effort to recruit among June graduates the 25 junior engineers needed by Bonneville this spring. Because private utilities offer higher starting pay to junior electrical engineers than the government allows, BPA is finding it difficult to obtain the services of graduate engineers from Pacific Northwest colleges.

Changes in Capacity Reported to Federal Power Commission

PLANT ADDITIONS DURING MARCH

State	Utility	Plant	Fuel	Capacity (Kw)
Ohio	Dayton Power & Light Co.	O. H. Hutchins	S	60,000
Ind.	Indiana & Michigan Electric Co.	Tanners Creek	S	125,000
Mich.	Detroit Edison Co.	Conners Creek	S	100,000
Iowa	Sac County Electric Co.	Sac City	IC	1,230
Kan.	Russell Municipal Electric System	Russell	IC	2,468
Del.	Seaford Electric System	Seaford	IC	1,140
Md.	Southern Maryland Electric Cooperative Inc.	Solomons	IC	1,900
N. C.	Duke Power Co.	Lee	S	90,000
Miss.	Mississippi Power & Light Co.	Rex Brown	S	66,000
Ark.	Arkansas Power & Light Co.	Hamilton Moses	S	66,000
Okla.	Oklahoma Gas & Electric Co.	Mustang	S	50,000
Tex.	Houston Lighting & Power Co.	W. Junction	S	75,000
Tex.	Gulf States Utilities Co.	Neches	S	60,000
Wyo.	Lower Valley Power & Light Co.	Freedom	IC	200
Colo.	Western Colorado Power Co.	Montrose	S	5,000
N. M.	El Paso Electric Co.	Rio Grande	S	30,000
Calif.	California Oregon Power Co.	Alturas	H	450
Pa.	Pennsylvania Power & Light Co.	Sunbury	S	100,000

PLANT RETIREMENTS DURING MARCH

Ohio	Nelsonville Department of Public Service	Nelsonville	S	600
Del.	Seaford Electric System	Seaford	IC	200
Fla.	Wauchula Municipal Light Department	Wauchula	IC	136
Ark.	Arkansas Power & Light Co.	Little Rock	S	650
Tex.	Central Power & Light Co.	Laredo	IC	1,200
Tex.	Central Power & Light Co.	Rio Grande	IC	100
Utah	Springville Power & Light System	Hobble Creek	H	140
Ore.	Mountain States Power Co.	Jordan	H	60
N. H.	White Mountain Power Co.	Bartlett	H	250

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of April 1—Steam, 50,474,400 kw; Internal Combustion, 1,921,572 kw; Hydro, 17,854,326 kw; Total, 70,250,298 kw.

NAED CONVENTION drew top men in distribution field. Among those present were, left to right, Walter Eichelberger, Philco Corp; R. M. Oliver, Landers, Frary and Clark; C. A. D'Elia, D'Elia Electric Co; Benjamin Gross, Gross Distributors, Inc; and W. G. Pierce, Jr, Pierce-Phelps Co and president of the distributors' association

Selling Could Cure Economy's Ills, Morrow Says at NAED Convention

"There is nothing wrong with our economy that vigorous selling could not, and will not, cure," Charles A. Morrow, Mullins Manufacturing Corp, told the 43rd annual convention of the National Association of Electrical Distributors at Atlantic City, May 21-25.

Although discussions ranged from problems encountered in operation of a distribution organization to the probable effect of the recent decision of the Supreme Court in the Louisiana Fair Trade case, the convention can be epitomized in that sentence from Morrow's address.

References to high inventories in the hands of suppliers and dealers were frequent in the meetings of the appliance division. K. G. Gillespie, chairman of the major appliances committee, predicted that five months from now those who were able to hang on to their large stocks would be very glad to have them, because appliances will be in short supply the second half of this year. Considerable concern about the recent "dumping" of radio and television sets in auction sales was expressed, but it was felt this was only a passing phase that would shortly cure itself.

Commenting on the Supreme Court's Fair Trade law decision, K. B. DeBevoise, NAED legal counsel, said federal law apparently allows underselling by dealers who do not sign fair trade agreements. He did not think there would be any immediate change in this condition since this would require action by Congress.

Better cooperation with electric utilities in the promotion and sale of appliances was urged by Walter Eichelberger, Philco Corporation. He said distributors were not being as helpful as they might be in the current "Range of the Stars" program of the Edison Electric Institute. More major appliance distributors should hire home economists and devote more attention to training dealers, he said. He predicted that in five years annual sales of room air conditioners would number in the millions instead of in hundreds of thousands, as they do at the present time.

The high point of the appliance section meetings was the presentation, "Billion-Dollar Baby," in which the electric houseware section of National Electrical Manufacturers Association dramatized the potentialities for sale of these goods by emphasizing their appeal as gifts glamorized in fancy wrappings. Introducing the presentation, R. M. Oliver, Landers, Frary & Clark, mentioned a recent series of pictures in "Life" showing "shower" gifts to a bride-to-be. The total cost of the gifts was $740, he said, and of this $16.95 was spent for the one single electrical present, a mixer, which evidently was obtained from a price-cutter.

Federal Reserve Board was urged in a resolution to reduce down-payment terms of Regulation W on purchases of consumer electrical appliances. Present down-payment regulations, the resolution said, have "created a serious artificial depression for tens of thousands of appliance sales and service retailers, thereby freezing inventories and tying up the resources of these small businesses to the degree that they are forced to sell at a loss, with rising bankruptcies for which we see no end."

Another resolution urged NPA to allow a longer turnover period for distributors' inventories of "catastrophe stocks" of overhead line materials, especially in the stormy seasons of fall and winter. It asked NPA to assign higher priority ratings for stock replacements, limiting end use of such ratings to catastrophe needs only, and to provide for local as against centralized stocks because of variations in standards and types of materials used in different areas.

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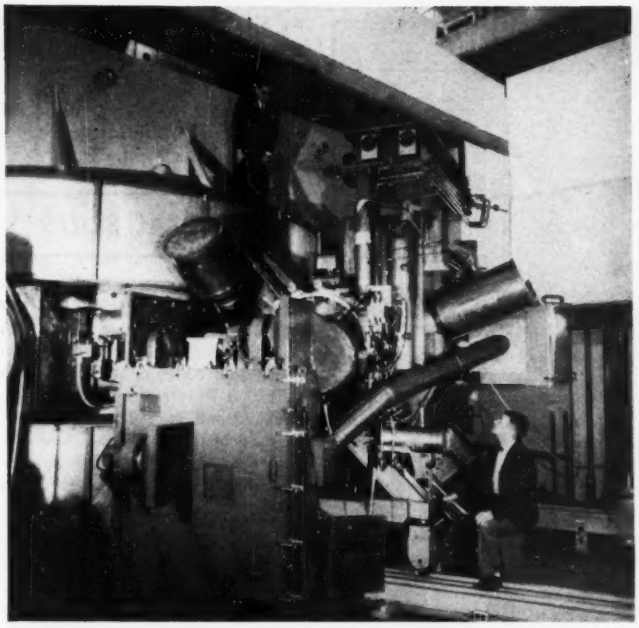
Alcoa Companies Must File for FPC Licenses

A recommended decision which would require two subsidiaries of the Aluminum Co of America to file applications for Federal Power Commission licenses for the continued operation of three hydro projects in Tennessee and North Carolina has been filed by FPC Presiding Examiner Glen R. Law.

The decision directs Knoxville Power Co to apply for a license for its project on the Little Tennessee River at Calderwood, Tenn.; and Carolina Aluminum Co to apply for a license for its Cheoah project, located immediately above the Calderwood project in North Carolina, and its Santeelah project on the Cheoah River nine miles above its confluence with the Little Tennessee.

The Alcoa subsidiaries contended, among other things, that the three projects were operated by Tennessee Valley Authority under an agreement, and therefore were exempt from FPC's licensing authority. The examiner said he saw no merit in this contention.



ATOM SMASHER said to be most powerful in world is tested at University of Chicago by Lester Kornblith, electrical engineer who helped design it, and John Marshall, seated at controls. Machine will aid in investigating effect of high energy beams on living tissue and how atom can benefit mankind. The synchrocyclotron has accelerated protons to an energy of 450 million electron volts

Oregon Fish Commission Again Vetoes Pelton Dam

For a second time, an effort to obtain Oregon state approval for construction of a power dam in the Deschutes River has failed. The state fish commission has vetoed the $22-million Pelton Project, holding that the proposed dam would be detrimental to the propagation of salmon by preventing the natural spawning of fish.

In spite of the ruling, Portland General Electric Co, the applicant, will continue efforts to obtain a permit for a dam site on the Deschutes, a river that runs north through central Oregon, emptying into the Columbia near The Dalles. Application for a Federal Power Commission permit is still pending and PGE also has applied for a certificate of necessity from the Defense Electric Power Administration. However, state permission is required, as the stream is wholly within the state of Oregon.

Approval of a permit to build the dam had been previously denied by the state fish commission to the Northwest Power Supply Co, an organization sponsored by Portland General Electric, Pacific Power & Light, and Washington Water Power companies. PGE later took over the assets and liabilities of the original company and reactivated the project. A new proposition was made, including an offer to make $1 million available for a fish hatchery, along with $100,000 annually for its maintenance, and a proposal to construct a $3 million downstream reregulating dam.

•

Paris Conference Slated

An international Conference on Light, with "Light and Homes" as its theme, will be held in Paris Sept. 26 through 30, the International Committee on Lighting has announced. Speakers will report on recent developments in applications of natural daylight and artificial light in homes, physiological reactions from fluorescent and germicidal lamps and related subjects.

SUC in North Carolina to Check Power Supply

The North Carolina State Utilities Commission has begun an investigation of the power situation in the state at the behest of Governor Scott, who charged a power shortage exists which prevents industries from settling there.

Even before his election, Scott had been in a controversy with the utilities over power supply. "The lack of abundance of cheap power is choking the very progress of our state," he commented recently.

Louis V. Sutton, president of Carolina Power & Light Co and Edison Electric Institute, denied the charges. Given the necessary turbines to meet planned expansion, he said, the private power industry can meet the state's needs adequately.

He said the U. S. Department of Interior has delayed private construction of a large hydroelectric project at Roanoke Rapids (EW, May 28, p 19), claiming at the same time the nation faces a serious power shortage.

Scott asked the commission to check into the state's present generating capacity, power facilities planned and under construction, amount of power companies purchased by companies both in and out of the state, firm power available in various sections of the state, comparative rates charged in sections of the state and surrounding states, and the state's need for additional power to meet normal growth.

•

Hydro License Sought for Connecticut River

Connecticut River Power Co, Littleton, N. H., has applied to the Federal Power Commission for a license for a hydroelectric project, designated the Fifteen Mile Falls Project, on the Connecticut River in New Hampshire and Vermont. The project would include two existing installations, the McIndoes and Comerford, and one new development, the Littleton.

The new dam would be located on the Connecticut between Littleton and Waterford, Vt. It would be 5,325 ft long and form a pond 11 miles long. The powerhouse would contain four turbines rated at 55,000 hp each and four 39,000-kva generators.

YIELDS (%) — Operating Electric Utility Securities

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1951									
May 24	**2.89**	**2.93**	**3.05**	**4.02**	**4.29**	**4.62**	**5.69**	**6.47**	**7.32**
May 17	2.89	2.93	3.06	4.00	4.29	4.61	5.60	6.36	7.17
END OF QTR									
1st 1951	2.87	2.93	3.00	3.95	4.19	4.52	5.47	6.20	7.13
4th 1950	2.65	2.67	2.78	3.86	4.14	4.51	5.80	6.54	7.44
3rd 1950	2.66	2.67	2.76	3.81	4.08	4.46	5.70	6.54	7.25
2nd 1950	2.68	2.66	2.74	3.79	4.03	4.38	5.38	6.51	7.50

Data: Reis & Chandler, Inc.

State Auditors Criticize Wasco PUD Practices

Despite a state audit report sharply criticizing its operating practices, the Northern Wasco (Ore.) Public Utility District still intends to go ahead with plans to purchase Pacific Power & Light Co facilities in the district.

The state auditors issued a report showing that the PUD had losses totaling $27,402 between July 1, 1949 and Dec. 31, 1950. Operating deficit for the period amounted to $10,010. Revenue totaled $57,110 and operating expenses $67,120.

President of the Wasco PUD, W. J. Seufert, has stated that the PUD would seek authority at an election in September for issuance of about $2 million in bonds to acquire the local properties of Pacific P&L. The PUD has competed with the private firm since April, 1949.

Included in the PUD's debts is $6,303 owed to Bonneville Power Administration for wholesale power delivered between July and December, 1950. Another unpaid item is $4,430 in property taxes owed to Wasco County for the first half of the 1950-1951 fiscal year.

Assets of the PUD as of Dec. 31, 1950, were listed as $359,361. The utility plant was given a net value of $310,444. Major share of the district's liabilities were $275,000 in revenue bonds and $36,321 in other debts including the amount owed BPA.

The report criticized the PUD for the system used for job orders and work orders, lack of complete maps showing installations, failure to set aside 5% of gross operating revenues for bond interest and principal payments, incomplete records on merchandise and materials sales, and failure to prepare and publish a budget.

Declaring he welcomed criticism of the district because it enabled the directors to rectify errors, Seufert said two employees have been hired to bring the records up to date.

•

House Unit Likely to Vote 3⅓% Public Power Excise

The House Ways and Means Committee has tentatively agreed to extend the 3⅓% electrical energy excise to public power agencies, exempting only farm electric cooperative systems financed by the Rural Electrification Administration.

A final draft of the new tax bill will not be brought to a committee vote until later, but extension of the electrical energy excise tax to city, state, and federal power systems appears certain to be included in the bill.

•

Millonzi Is Nominated by Truman for SEC Post

Robert Millonzi, Buffalo, N. Y., attorney, has been nominated by President Truman for the Securities and Exchange Commission position vacated by Edward McCormick.

Millonzi's choice, announced by the White House May 22, came as a disappointment to some members of the SEC staff who had hoped that a staff member would be named for the term expiring in June, 1952. McCormick, who resigned to become president of the New York Curb Exchange, was elevated to the commission from a staff post.

FINANCIAL BRIEFS

Westinghouse Electric Corp has reported that 99% of an issue of 2.65% debentures that had been called for redemption have been converted into common stock. The remaining 1% were redeemed for cash. The redemption reduces the company's debt to $23,842,000, which is less than one-sixth of the postwar peak of $148 million reached in 1948.

Electric Bond & Share Co, N. Y., has been granted an extension of time by the Securities and Exchange Commission in which it must dispose of its interests in Florida Power & Light Co and Montana Power Co. The company was given until June 30 to dispose of its Florida interests and until December 31 to sell its holdings in Montana.

Rates in the seven New England Electric System subsidiaries whose merger with Worcester County Electric Co (EW, Oct. 9, p 86) was recently approved by the regulatory commissions will be reduced about $472,000 a year. All classifications of customers will share in the cuts. Householders will save about $244,000 a year, small commercial customers $125,000 minimum, large commercial and industrial more than $94,000, and street lighting about $8,500. Companies united with the Worcester utility center at Athol, Palmer, Gardner, Clinton, Winchendon, Spencer, and Milford, Mass. Gas properties will be separated.

Electric Utility Financing—May 19-26

Company	Description	Amount of Offering (000)	Offering Price	Yield at Price to Public
Common Stock				
Virginia Electric & Power	449,674 sh new money	$8,550	$19.00	6.32%
Kentucky Utilities	260,071 sh new money	3,500	.....	....

SCHEDULED FOR FOLLOWING WEEK

Common Stock—Arizona Edison, 40,000 sh new money, $700,000; New England Gas & Electric, 197,243 sh new money, $2.5 million.

Snake River Projects of Idaho Power Co Hit

Another tooth-and-nail fight is rapidly shaping up before the Federal Power Commission between a private power company and the Department of the Interior.

Interior Secretary Oscar L. Chapman May 23 urged the commission to reject the application of the Idaho Power Co for a license to build a hydro plant at Oxbow, Oregon. The 140,000-kw Oxbow Project is one of five run-of-the river projects Idaho is to construct on the Snake River in Idaho and Oregon. Their construction would conflict with federal plans for the construction of two high dams, Hells Canyon and Nez Perce.

In a letter to FPC Chairman Mon C. Walgren, Chapman declared, "Construction of this dam would result in a major economic loss to the nation and to the region."

Pointing out that the Oxbow Project, near Oxbow, Ore., plus the other proposed company projects in the area would total only 487,000 kw, Chapman estimated total prime power from developing Hells Canyon at over 1.4 million kw. He explained that the 800,000-kw Hells Canyon Project would have a prime capacity of 688,000 kw, add 723,000 kw of prime power at downstream Columbia River projects, and provide an additional 19,000 kw through integration with other federal projects.

Congress is being asked to authorize Hells Canyon this year and appropriate $8 million for use during fiscal 1951.

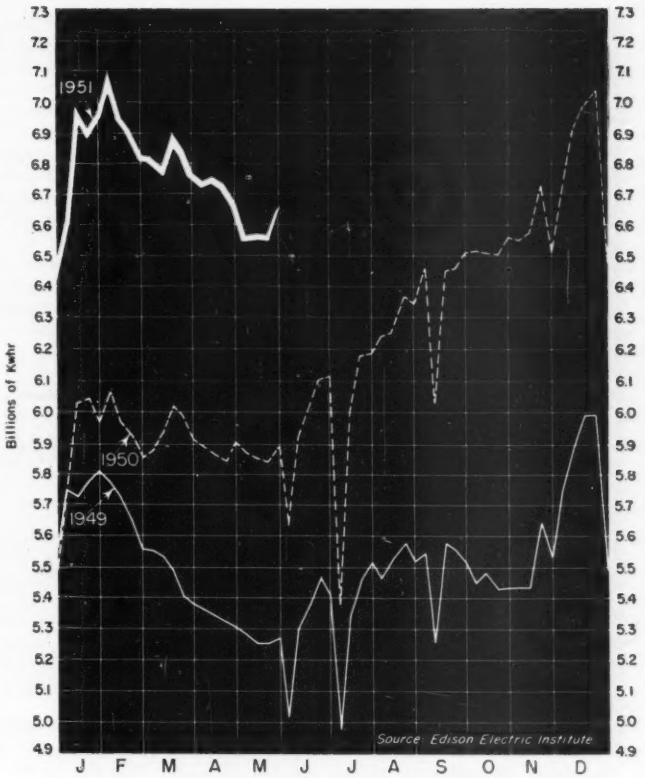
•

City Light Monthly Load Rises 100 Million Kwhr

Monthly load of Seattle City Light has increased nearly 100 million kwhr with municipal acquisition of Puget Sound Power & Light Co properties, the first operating report covering the merged systems reveals.

The report shows an output of 219,833,000 kwhr in March, as compared with 120,039,000 kwhr during the same month a year ago. The acquisition became effective March 5.

City Light statisticians estimate, however, that 137,032,000 kwhr of the March output was handled over original City Light lines, a gain of 14% irrespective of the acquisition.



Output Week Ended May 26—6,652,699,000 Kwhr

Weekly Output, Millions Kwhr

1951	1950	1949
May 26 6,653	May 27 5,894	May 28 5,270
May 19 6,559	May 20 5,845	May 21 5,255
May 12 6,567	May 13 5,864	May 14 5,527
May 5 6,560	May 6 5,868	May 7 5,284
Apr 28 6,674	Apr 29 5,902	Apr 30 5,304
Apr 21 6,730	Apr 22 5,846	Apr 23 5,326
Apr 14 6,747	Apr 15 5,863	Apr 16 5,343
Apr 7 6,736	Apr 8 5,898	Apr 9 5,360
Mar 31 6,767	Apr 1 5,912	Apr 2 5,378
Mar 24 6,848	Mar 25 5,993	Mar 26 5,404

Percent Change from Previous Year

	May 26	May 19	May 12
New England	+14.3	+10.6	+13.3
Mid-Atlantic	+13.1	+11.1	+12.3
Central Industrial	+12.9	+13.5	+13.6
West Central	+11.2	+12.3	+11.0
Southeast	+12.3	+12.9	+11.8
South Central	+17.7	+16.6	+13.7
Rocky Mountain	+11.1	+ 9.9	+ 9.9
Pacific Coast	+11.6	+10.0	+ 8.9
Total United States	+12.9	+12.2	+12.0

MEETINGS

Edison Electric Institute
Annual Convention, Shirley Savoy Hotel, Cosmopolitan Hotel, Denver, Colo., June 4-7.

New York Meter Engineers Committee
Hotel Statler, Buffalo, N. Y., June 7-8.

American Society of Mechanical Engineers
Semi-Annual Meeting, Royal York Hotel, Toronto, Canada, June 11-14; Fall General Meeting, Hotel Radisson, Minneapolis, Minn., September 25-28.

Northwest Electric Light & Power Association
Accounting Section, Boise Hotel, Boise, Idaho, June 14-15.

Canadian Electrical Association
Annual Convention, Algonquin Hotel, St. Andrews, New Brunswick, June 18-21.

American Society for Testing Materials
Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 18-22.

Michigan Electric Light Association
Annual Convention, Mackinac Island, Mich., June 24-27.

American Institute of Electrical Engineers
Summer General Meeting, Royal York Hotel, Toronto, Canada, June 25-29; Pacific General Meeting, Multnomah Hotel, Portland, Ore., August 20-23.

Pacific Electronic Exhibit
Civic Auditorium, San Francisco, August 22-24.

Illuminating Engineering Society
National Technical Conference, Hotel Shoreham, Washington, D. C., August 27-30.

Northern California Electrical Bureau
Annual Exposition, Civic Auditorium, San Francisco, September 1-9.

Rocky Mountain Electrical League
Fall Convention, La Fonda Hotel, Santa Fe, N. M., September 9-12.

★Addition this week.

WASHINGTON COMMENT

RONALD D. ROSS

The electric utilities expansion program is being hit where it hurts—in the industry's allocations of critical metals. Third quarter quotas of aluminum and copper for the industry will be down. They will be sharply cut from the present (second) quarter and seriously below Defense Electric Power Administration estimates of the industry's requirements.

As this is written, Depa is protesting the tentative third quarter figures which it has received from Defense Production Administration. (EW, May 28, p 4). Depa can't win in this sort of argument—DPA is a couple of echelons above Depa in the mobilization hierarchy—and there will be few concessions above the low, first DPA quotas in the third quarter.

The "whys" and "wherefores" of this official slap at power expansion plans are of vital concern to the electric utilities.

No Plan to Cut Power Expansion

A decision to cut back on materials for power expansion to the contrary, there has been no actual decision to curtail the industry's expansion plans. The greatly reduced materials quotas are not designed to stop or even slow power expansion.

It's true that there's been talk of "let them use candles" from some high mobilization officials. Such talk, however, was made in jest, and at least one official guilty of this type of humor has departed.

The theory on which the electric utilities are being handed materials cuts appears to be that planned power expansion can move ahead on quite a bit less aluminum and copper than Depa is asking. This in turn is less of these metals than the industry itself, in its reports to Depa, has estimated it will need. Nor need there be any mystery as to the source from which such a theory comes. It's practically a matter of record.

In January, Depa asked the utilities to report conductor requirements for the second quarter. The answers, adjusted for smaller systems not polled, added up to over 60 million lb of aluminum. Depa recognized that not all the planning would materialize on time, dropped the estimate it took to the National Production Authority to 53.5 million lb. NPA allotted 49 million lb of aluminum for the second quarter.

Utilities Didn't Use Aluminum Allocated

By the first days of the second quarter, aluminum producers were complaining to Depa that electric utility orders were lagging behind the 49-million-lb rate for which DO's were authorized. Depa publicly requested that the utilities use their DO's. Another, more urgent appeal came May 17, when Depa Administrator McManus flatly announced that the electric utilities are not using their second quarter DO's. He added ominously, "The aggregate requirements of the industry for program materials are judged by the amount of material ordered by use of DO ratings."

It's true that inventories and inevitable delays have accounted for some of the failure to use DO's. This is not the whole story. The amount of aluminum—and the copper situation is much the same as aluminum—needed by the electric utilities in the current quarter appears to have been drastically overestimated. This has led the defense mobilizers to feel that they can make some stiff cuts in the industry's listed requirements without serious consequences.

As we have pointed out here (EW, May 21, p 118), getting all the materials needed for power expansion plans now in the works will take a selling job. It also needs to be added that significant discrepancies between requests and actual requirements will not help in selling the mobilization planners on the urgency of the industry's needs.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Underground system performance is enhanced if no inspection reports are "closed" until defective conditions as reported have been rectified.

Insulating oil does not begin to deteriorate by oxidation until its inherent inhibiting constituents have been weakened by exhaustion; refining does not replenish the inhibitor but may extract more.

Magnesium anodes in one side of each divided water box condenser may prove effective in retarding galvanic corrosion of tubes.

Pin insulators have had the groove deepened by the sawing action of a conductor not held tight by the tie when wind and ice unbalanced the tensions in adjoining spans.

Oriented grain strip steel has been a factor in deferring resort to double-frame construction for large hydrogen-cooled 1800 rpm turbogenerators.

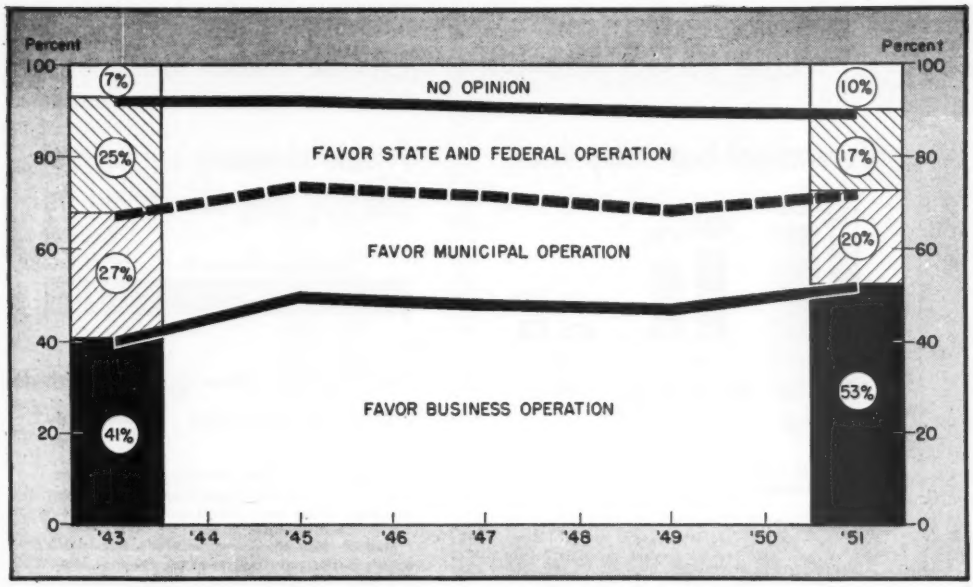
Eight large generators in the Chicago area have been running at 22 kv for 20 years and have given a good account of themselves. Higher generated voltages are available for higher capacities.

Voltage drop between first and last transformer determines how much load can be picked up economically at any intermediate point.

Geothermic heat in Italy's Lardarello area produces 285-420 F steam at 15-18 atmospheres; there is a plant with seven 12 Mw sets and another with four. One with four of 26 Mw is being built.

Germanium crystals in pure state have high electrical resistivity but light shining on them releases electrons which then facilitate conduction.

Sound muffling will be studied in an MIT acoustical chamber comprising 256 noise-generator loudspeakers of 320 watt input.



What the Public Thinks About the Electric Companies

Federal ownership of electric power facilities is now favored by only 10% of the voters

Today a majority of the American voters (53%) favor operation of utilities by private business concerns rather than by the municipality, state, or federal government. This compares with a vote of only 41% in 1943 when the first national survey was made by Opinion Research Corp for the electric companies' advertising program. This change in the public's attitude comes about due to many factors. Spokesmen for the program claim only an appropriate share. All in all the greater portion of credit goes to the performance and good service provided by the electric utilities in every part of the country. Since 1943 electric rates have continued downward in the face of a sharp increase in the cost of living. Utilities have been telling their story to the public in a much more effective way, and perhaps the economic intelligence of the people has moved a step forward. Fewer people are taken in by misleading propaganda related to federal power agencies. A further factor is the general trend to the right in politics. Only 6% favor socialism compared with 10% in 1949.

Although a lower percentage of the voters favor municipal operation, 20% compared with 27% in 1943, this change is about the same as the drop from 18% to 10% in those favoring federal ownership. This can easily be accounted for by the fact that on the whole municipal operations have a long and good record. The majority of those who still favor governmental ownership do so because of their desire for lower rates. Lower income groups seem to lean in this direction.

Although there is some decline, approval of TVA is still very high, 58% compared with 61% in 1943. Of those approving, 28% say it is because it benefits the region and its people; 18% because it supplies electricity to those who wouldn't have it otherwise and 15% because it provides electricity at low rates. Even though it can be proved that the people in Tennessee have not gained economically as much as those in adjoining southern states, the propaganda to the contrary has been effective.

The feeling that electric companies make too much profit has changed radically since 1943, a drop from 24% to 15%. At the same time 67% now say rates are reasonable compared with 85% in 1943.

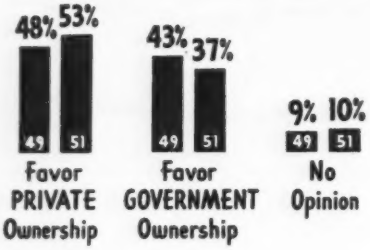
Only 6% think there is danger of a shortage of electricity. This feeling is highest in the northwest where 13% expressed this opinion.

On the unfavorable side, only 9% of the public say that an electric company employee has talked with them about the company in the last year or so. The startling total of 84% said they knew of nothing special that the electric company had done for the community.

For more details please turn the page →

LOW RATES AND GOOD SERVICE RANK HIGH

Government ownership issue



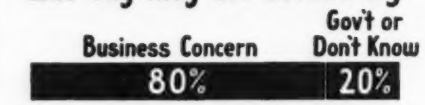
Lower rates is the chief factor causing people to favor government ownership of the electric company

Few people — only 3% of those who favor government ownership — say they favor it because of savings in taxes. 10% of those who favor government ownership believe that they would save the money now going into profits.

Supporters of private enterprise do so first because they are opposed to government ownership in principle (26%). Others say private operation is more efficient.

In 1951 only 16% of the voters felt that it would be a good idea for the federal government to produce and sell all of the electricity in this country. This is a material change from 1949 when the vote was 25%.

Private company customers who say they are served by:



Vote:
71% for private ownership
23% for gov't ownership

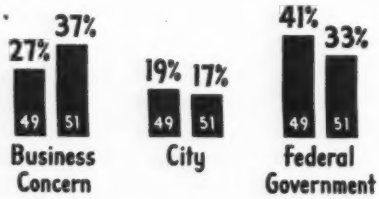
Vote:
12% private
68% gov't

Today 20% of utility company customers either think their electricity comes from a government operation or say they don't know who serves them

Most of those who do not know who supplies their electric service vote for government operation (68%). This clearly shows the tendency of the uninformed to favor federal power. (They may be the ones who would vote for socialism or in some cases communism.)

This situation presents a clear cut opportunity for improving customer education at the local level, not only in telling the voter who serves him but also how good that service is.

Which would give lowest rates?

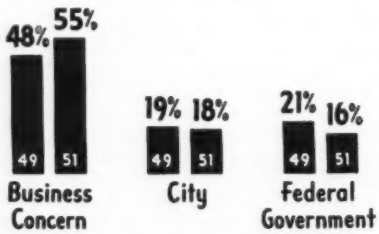


More Republicans than Democrats believe that electric company would give lower rates.

Opinion as to who will give lowest electric rates is correlated more with political philosophy and income group than on any other basis. 47% of the Republicans choose the electric company, compared with only 29% of the Democrats. Similarly 49% of the upper compared with 28% of lower income group vote for the company.

	1943	1951
Business	19%	37%
City or town	23	17
Federal government	49	33
No opinion	9	13

Which would give best service?



Electric companies make little impression on customers except in cases of emergency

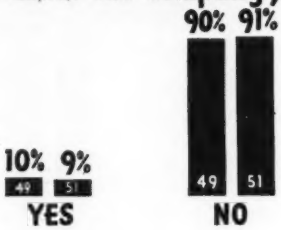
Only 32% of the people know anything the company has done to give good service in the past year. Of those who did recall the company had done something, 44% mentioned prompt or good emergency service, 16% supplying new equipment and 15% restoring service after the storm. The number who recollected something was considerably higher in the November 1950 storm area.

Courtesy itself received a low vote, only 5% mentioned this separately.

Of those served by a co-op or public agency, 44% recollected some special effort.

COMMUNITY ACTIVITIES GET LITTLE NOTICE

Has any employee talked with you about the company?



Employees are doing little to improve their company's public relations

Only 9% of the public say that an electric company employee has talked with them about the company. Of these 7% say that the employee was promoting electric appliances. This seems to be a direct result of the lack of sales effort and sales personnel over the last few years.

Of those who remembered a conversation with an employee, 24% had some problem such as wiring, a bill adjustment, lighting, etc. Some remembered unfavorable contacts but most were favorable.

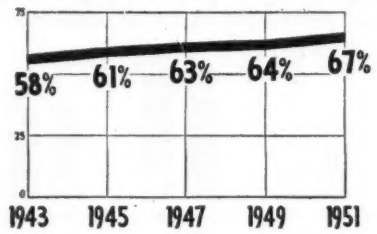
Recall anything electric company has done for community?

The electric companies' participation in community affairs is receiving little credit

Following closely the vote on recollection of an employee contact, only 16% can recall any extra things the electric company has done for the community.

Topping the list of things they did remember was Christmas decorations. The number who knew of promotion of new business and industry were less than ½%. Donations to community funds, local charity drives, hospitals, and Red Cross were known to 2% of those served by an electric company.

Say local electric rates are reasonable



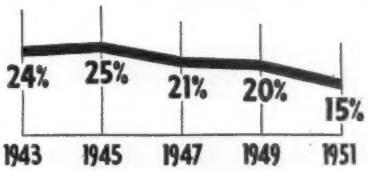
Reasonableness of utility rates is gaining favor slowly but surely

The vote against calling rates reasonable is heavy in the low income group, but the trend favors the companies. This was in answer to the question: Which would probably give you the lowest electric rates?

	1943	1951
Company	19%	37%
City or town	23	17
Federal government	49	33
No opinion	9	13

20% served by Co-ops and public groups say rates are too high, compared with 27% in the company category.

Say electric company makes too much profit



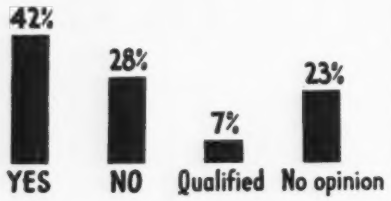
Only 15% of those served by power companies say they make too much profit

This is very low since it compares with 10% who say that co-ops or public suppliers make too much profit. There is a definite relation here with those who wish federal ownership. Should the public become convinced that there is really no profit in the power business, the desire for federal power would diminish materially.

A substantial percentage, 34%, think the electric companies would try to keep rates high even if costs should go down. For the co-ops and public power utilities the vote was still 23% so the difference is not large enough to be serious.

THREAT OF SOCIALISM IS RECOGNIZED

Is the United States moving toward Socialism?

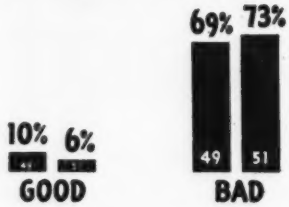


The trend toward socialism is recognized by 42% of the voters

A belief that this country is moving toward socialism is held by 42% of all the people of voting age. Those in the upper income brackets (58%) and Republicans (52%) feel it most. The men (46%) seem to recognize this trend more often than the women (37%).

Those in the far West and in the cities are much less of this opinion than those in the south and in rural communities. There are fewer with no opinion in the middle west than in any other part of the country.

Would Socialism be good or bad for United States?



The trend toward socialism is objected to by 73% of the group

An interesting point here is that 76% of those served by co-ops or public power oppose socialism compared with 73% in areas served by electric companies. This grows out of the fact that socialists are concentrated in cities. In these areas 9% favor socialism compared with 4% in rural areas.

Of those who favor federal ownership of power, 19% favor socialism. Further, of those who favor socialism, only 3% favor supply by electric companies.

Those 21 to 29 years of age and those in the lower income group vote 8% for socialism.

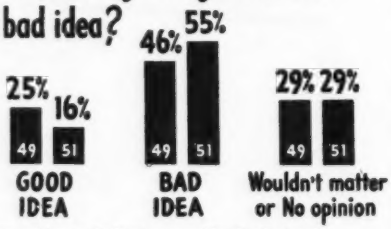
Federal production and sale of all electricity would be move toward Socialism

The relation between federal power and Socialism is clear for almost ⅔ of the people

Now 62% of the people think federal power is a move toward socialism. This holds no matter who serves the customer. But only 37% of those who favor federal ownership believe that this is a trend toward socialism.

Some people do not recognize socialization of the electric power industry as a trend toward a socialistic state. That is, government provision for certain services isn't socialistic, they say.

Would Govt. production and sale of all electricity be a good idea or a bad idea?

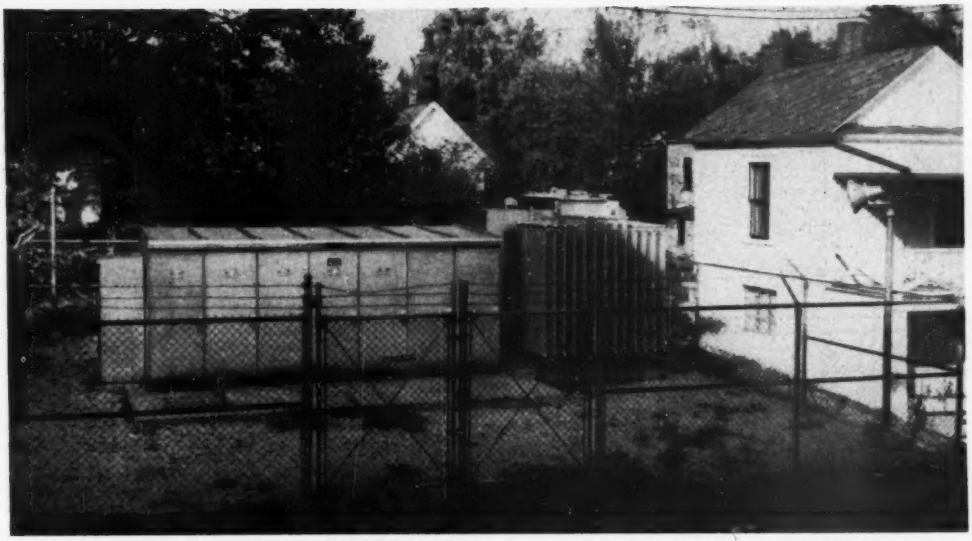


Opposition to federal ownership of all electric power facilities has increased substantially

Opposition to complete nationalization of the electric power industry is based upon the belief that it would be bad in principle, undemocratic, and harmful to our economic system.

Of those who favor federal ownership only 63% wish to nationalize the whole industry. The far West and the cities vote 20% and 22% respectively compared with 14% in the south and 13% in rural areas.

Close to half the people are not opposed to federal ownership. 16% say it would be a good idea, 29% say it wouldn't matter much.



UNIT SUBSTATION for network at Third Street includes a 4,000-kva 19/4-kv transformer, one 4-kv bank breaker and four tie feeder breakers. Protective floodlighting projectors on pipe standards also aid night servicing

Atlanta 4-Kv Overhead Network Served From 19-Kv Underground Cables

Learn why a 4-kv overhead network was selected to serve a fringe area outside downtown Atlanta. System provides more reliability and flexibility for future expansion and defers a complete underground system as long as possible.

R. O. LOOMIS and P. B. BOYD
Georgia Power Company, Atlanta, Georgia

The downtown underground area in Atlanta covers approximately 0.45 sq mi and has a peak load of approximately 48,000 kw, excluding transit load. This represents a peak load of about 106,000 kw per sq mi. Immediately north of the underground section is an area about one and a half miles long by three-quarters mile wide, which has a load at present of about 13,500 kva. This is approximately 12,000 kva per sq mi. This area is still in the transition stage from a residential to a commercial area. The area contains numerous hotels, office buildings, and theatres, which are rather widely separated. As a result, although the overall load density is low, we are called upon to serve numerous spot loads of the order of 400 to 1,000 kw.

Prior to the construction described here, this area contained no underground system nor any supply substation. The area was approximately equally distant from four existing substations and 4-kv feeders into the area averaged approximately one mile long. Because of the commercial aspects of the area it was included in the fire limits area and no overhead sub-transmission lines were in the area. The former method of supply to the area consisted of five 4-kv feeders. In 1938 the non-coincident sum of the peak loads on these feeders was 5,400. By 1946 this load had grown to 11,800 kw. The five 4-kv feeders with a rating of 2,000 kva per feeder were all overloaded and the substations supplying them were also overloaded.

Although there was no underground system in the area, it had become necessary to install underground vaults at a number of locations to supply the larger loads. These transformer banks were all supplied from the overhead 4-kv circuits. In order to supply satisfactory service to some of the hospitals and theatres, two or three transformer banks supplied from different circuits were net-worked. These points determined the dividing lines between

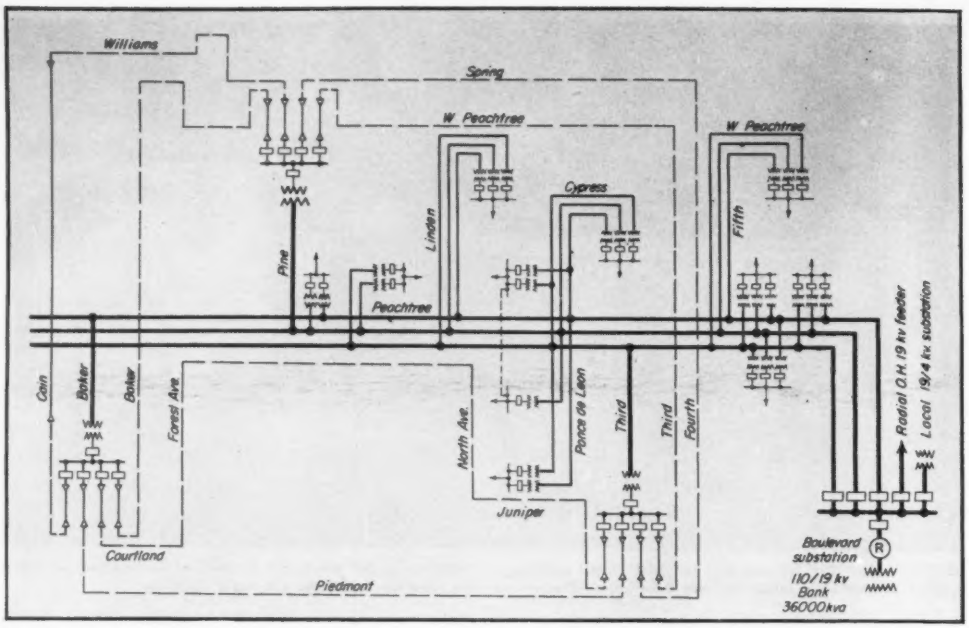


FIG 1—SYSTEM DIAGRAM showing underground portion of the system including all secondary spot networks. Underground secondaries in street are installed at only one or two locations. Boulevard substation has separate regulated 19-kv bus

circuit areas and prevented adjustment of circuit areas to give the best load balance. It became apparent that the minimum requirement for the area was a new substation and an expansion of the underground portion of the system.

It was necessary to decide at what voltage the underground system would be supplied and how large an area the underground system would cover. Due to the size of the area and the spotty character of the load it was impractical to consider a complete underground secondary network. Because of the difficulties and expense involved we did not want to establish a 4-kv radial underground system. Such a system can become quite expensive and complicated when attempting to guard against long outages due to cable failures. The nearest existing overhead 19-kv lines did not have sufficient capacity to carry a large new substation in this area and it became apparent that it would be necessary to supply such a substation with underground 19-kv cables.

Since it was necessary to install the 19-kv supply lines underground it was decided to supply the larger loads from spot networks supplied directly at 19 kv from these cables. The initial installation of the cables therefore resulted in the minimum of three cables for network purposes. Fortunately most of the large loads involved were located along two parallel streets so the duct lines required to reach them were not great. These cables were planned to originate at our Boulevard Substation where we installed a new 36,000-kva 110/19-kv transformer bank, one 19-kv voltage regulator (which will be discussed later), and a new regulated 19-kv bus. The three cables were installed in one duct line 2.93 mi long of which approximately 1.2 mi was on Peachtree Street adjacent to the greater number of large loads.

The choice of a 36,000-kva bank was made because all other banks in the Atlanta area were of this size. Each 19-kv cable is capable of carrying 9,000 kva. Three cables with provision for one out of service are good for 18,000 kva. The ultimate for one 36,000-kva bank is five cables. With one out of service the remaining four can carry 36,000 kva, equalling the bank size.

No attempt will be made to enumerate all the comparative advantages of network substations versus one radial substation. We do feel that as the underground area expands, it will be more practical to move a network substation out of the underground area than to retain a large substation perhaps surrounded by the underground area.

Each network unit substation consists of a 4,000-kva transformer, one 4-kv bank breaker and four tie feeder breakers. The ultimate for five 19-kv cables would of course be five network unit substations. These can carry 20,000 kva even with one out of service. The bank size is rather large, so that we believe 19-kv cable load will govern expansion, rather than load on the unit substations.

The principal distinction in this system is the absence of 4-kv regulating equipment in the substations, and the use of the 19-kv regulator at the Boulevard Substation to regulate customers served either directly from 19,800-120/208-v network transformers and customers fed from the 4-kv overhead network. Careful selection of the sites for the three network substations resulted in a minimum length of duct line and 19-kv cable to reach them. The three substation sites cost

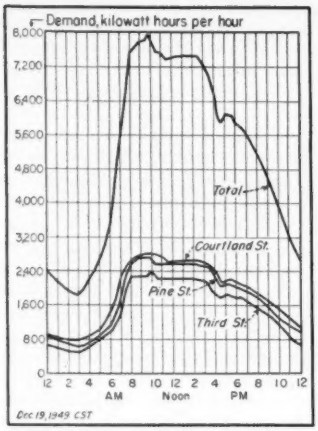


FIG 2—LOAD CURVES on the three individual substations and the total. Note peak load for entire network and each substation occurs at about 10 A.M.

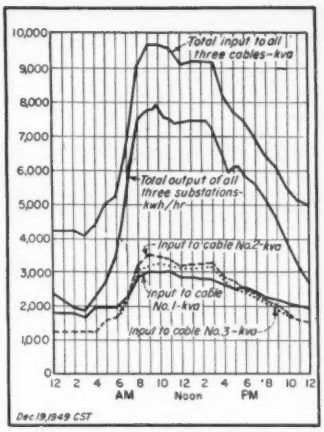


FIG 3—INPUTS to the three 19-kv network cables and the total load on the network cables compared to the load on the 4-kv overhead network

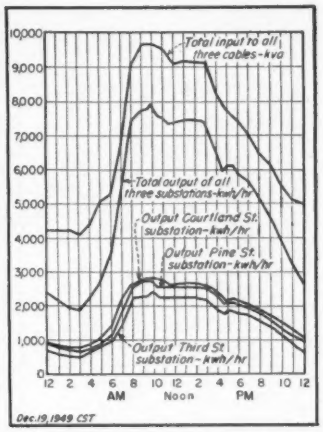


FIG 4—LOAD CURVES show total input to 3-19 kv cables in kva and output of the 3-19/4kv substations in kwh/hr. Stations do not share load evenly

$16,615 altogether. One of them was the back end of a lot covered by an old carriage house, which was torn down. Another was located off the street with a 10-ft alley retained for duct lines and driveway.

The overhead network consists of two tie feeders between each adjacent substation, or a total of six tie feeders. This required twelve 4-kv cable risers. It is interesting to note that the network completely diversifies the load on the individual tie circuits, so that even in 1950 the total load on the overhead network was only slightly over 9,000 kw. It should be remembered, of course, that the larger loads are no longer connected to the 4-kv overhead system. Total load on the three 19-kv cables in 1950 was 13,500 kva.

Costs are always interesting even though they are changing so fast that costs of a year or two ago are out of date. The costs of the various components of the 4-kv network system, per kilowatt of maximum demand during the first year of operation are shown in the Table.

All these costs apply of course to this specific job and would not be representative of average conditions. These costs do not include the main duct line and 19-kv cables, nor costs of serving large customers with secondary spot networks.

If the primary network system is considered capable of carrying 12,000 kva of load, the cost was $22.90 per kva.

Operation of Network . . . A single line diagram of the system is shown in Fig. 1. This diagram is devoted almost entirely to the underground portion of the system. All the secondary spot networks are shown. Underground secondaries in the street are installed at only one or two locations. It may be years before a complete secondary network exists even along Peachtree Street, the route of the main duct line. However, the backbone of the system is in place, making it possible to serve loads which would be embarrassingly large to supply from 4-kv circuits. A separate 110/19-kv transformer bank is provided at Boulevard Substation with a separate regulated 19-kv bus. The three 19-kv network feeders originate on this bus. As mentioned previously, there is no regulating equipment in the unit substations.

TABLE OF COSTS

	Cost per kw of Actual Load
1. Total cost of three network unit substations, completely installed including land	$16.28
2. Cost of all 4 kv overhead line work necessary to create six tie circuits	2.78
3. Cost of 19 kv tap cables and duct line from main duct line on Peachtree Street to the three unit substations	5.22
4. Cost of 12—4 kv cable risers including necessary duct work	6.32
Total	**$30.60**

The regulating equipment in the normal overhead network serves two functions; first, it regulates the voltage of the associated 4-kv bus, and second, by virtue of reversed reactance compensation it prevents the flow of reactive kva in the network. This flow of reactive kva would inherently occur because of a difference in voltage levels of the supply buses. This difference in voltage level would result either from unequal loading of the supply lines or unequal impedance of the supply circuits, assuming that they originate on the same bus. In our system as it operates, the cables are in the same duct line and therefore practically the same length, and the loading is balanced by the network operation of the other load on the cables. Of course, the uniformity of load density in the area helps make this possible.

Conditions immediately after the network was placed in service are represented in Figs 2, 3 & 4 and consequently the load is not as great as occurred in the winter of 1950. Fig. 2 shows the load curves on the three individual substations and the total. Note that the peak load for the entire network and each substation occurs at about 10 A.M. It might be argued from Fig 4 that the network substa-

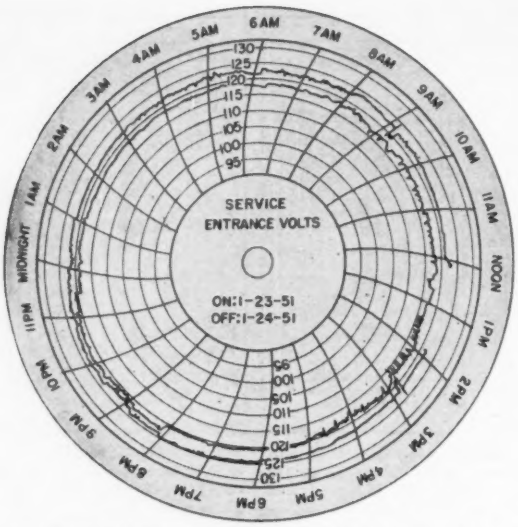


FIG 5—SIMULTANEOUS VOLTAGE CHARTS for (a) an underground service entrance of an office building supplied by two 500-kva 19.8/120-208-v network transformers, and (b) an overhead service entrance supplied from the 4-kv primary network

tions do not share the load equally. This is true, but studies show that they come closer to dividing the load when one station is out of service, which is more important. Fig 3 shows the inputs to the three 19-kv network cables and the total load on the network cables compared to the load on the 4-kv overhead network. The 4-kv overhead network has 3,600 kva of capacitors connected to it in an effort to improve the peak load power factor. These capacitors were installed during the last few years that the system operated as radial 4-kv feeders to reduce the overload on the radial circuits. These capacitors have been retained since network operation was started, and serve to sustain voltage on the open end of a tie feeder when one feeder breaker is open. Since it is impractical to install 208-v capacitors for the larger customers it is felt that an excess of corrective kva is desirable on the 4-kv network to provide a good power factor on the 19-kv cables. The peak load on 4-kv tie circuit #3 occurs at 7 P.M., although Fig 2 shows the entire network peaked at 10 A.M. This illustrates the benefits of diversity obtained from network operation. During 1950 the network distributed slightly over 41 million kwh with an annual load factor of 52%.

The kva input to the cables shown in Fig 3 are calculated from readings of amperes and volts on station log sheets. The first division on the ammeter scales is 50 amp, consequently the readings from midnight to 6 A.M. are quite inaccurate. This is unfortunate since there is more liklihood of circulating reactive at light load than at peak load, and no reliable conclusions can be drawn from the curves at this time of night. The 4-kv amperes and kilowatt loads were obtained from recording instruments and should be reasonably accurate.

The final answer as to whether it is possible to regulate both the underground and overhead customers with the same regulator is shown by the voltage they receive. Fig. 5(a) shows the actual 120-v secondary voltage delivered to the service entrance of an office building supplied by two 500-kva 19.8/120-208-v network transformers. This customer's voltage varies from 121 to 125 v. When one of the cables and its associated bank serving this customer is out of service, this customer's voltage drops about 3%. Fig 5(b) shows the service entrance volts received by a typical customer supplied from the 4-kv primary network. It should be remembered that both these charts are customer's secondary voltage and Fig 5(b) includes overhead secondary voltage drop. When the area was operated from radial 4-kv feeders our service voltage was nominally 115 v which we have raised to 120 v since conversion to the network. The overhead system has not yet been raised to the full 120-v level which can be done by taps in the network transformer.

One problem associated with regulating both overhead and underground customers with the same regulator is caused by the fact that underground customers are supplied by one transformation, whereas overhead customers are supplied by two transformations. In order to compensate for this inequality the reactance of the transformers supplying secondary networks is 10%, the reactance of the network unit substations is 5½% and the overhead transformers are the standard reactance of 3 or 4%. The elmination of regulating equipment in the unit substations eliminates a considerable maintenance item, since the substations are merely a transformer and associated switchgear corresponding to the network transformers serving underground secondaries. We have used this composite system of regulation for years where the 4-kv lines are underground cables supplying another secondary network.

Service continuity has been exceptionally good on the overhead network, thus preventing pressure to transfer customers to the underground system solely because of service.

During 1950 while studying transmission problems on the a-c network calculator, we used one day to set up this 4-kv overhead network to determine what effect the addition of a fourth cable and network unit substation would have on the system. The voltage on the open end of a tie circuit varies from a minimum of 1.5% to a maximum of 5%. This maximum occurs on a circuit which has what amounts to a radial load tapped to it near Courtland Street Substation. It would be more desirable to have this load supplied by a separate breaker, but we did not feel that the cost of another breaker was justified. It might be pointed out that calculations indicate that the normal voltage drop from a 4-kv bus to the lowest voltage point on the tie circuit is less than 1%. This does not include drop in radial tap lines connected to tie circuits.

CONTROL CENTER on cable-laying barge from which Bonneville Power Administration laid world's largest high voltage submarine cable. Instruments read cable tension desired, speed cable is leaving ship, actual cable tension. Recording table on left, plotting table right. Upper phone, intercom and ship p.a. system. On floor, ship-to-shore set

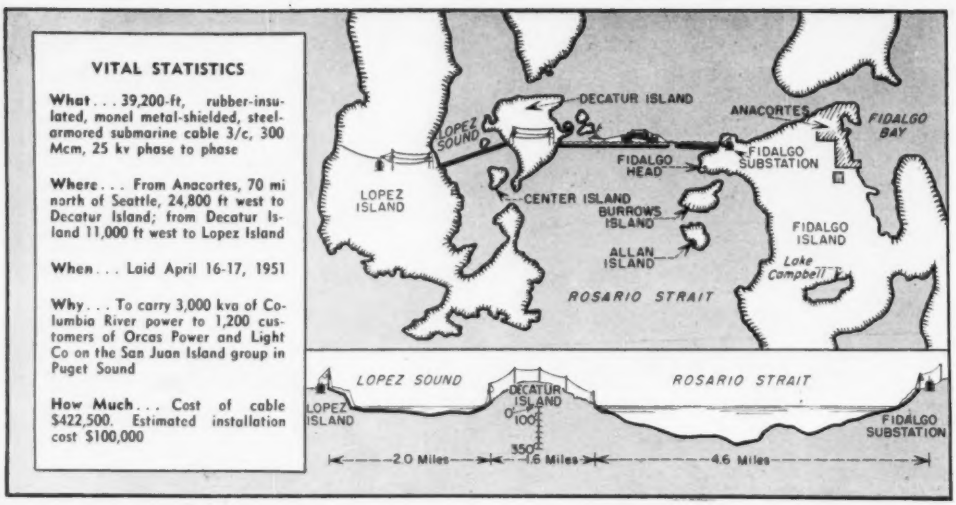
Planning Pays Off in Laying World's Largest Submarine Power Cable

Careful coordination of communication ship-to-shore, ship-to-ship, and on board cable-laying barge assured close control of path followed, cable tension, and speed of ship

Meticulous planning paid off when Bonneville Power Administration completed without a hitch laying in the waters of Puget Sound the world's largest high voltage submarine power cable, (EW April 30, '51). Two-way radio communication between the cable-laying barge and tugs provided close control over speed and direction of the laying; between the barge and transit crews on shore it provided exact location every two minutes, and a permanent record of where the cable actually was laid. Of particular interest on the job were: (1) Preparations and precautions, (2) equipment, and (3) procedures used. Specific information on the cable, which has been described before, is given in a separate listing on the next page.

Preparations and Precautions . . . Choice of a date and time when weather was near-perfect was no accident. Laying of the two lengths of cable required a combination of low tide giving cross currents of less than 1 mph, a cross wind of less than 10 mph, and visibility of 4 mi for the longer run. Weather records for the preceding six years were studied to determine the probability of good weather for possible dates as determined from a special study of tidal currents by the Coast and Geodetic Survey. Special five day and two day forecasts were issued by the Weather Bureau. Bonneville retained Irving Krick, well-known meteorologist, for special long range forecasts of Puget Sound weather immediately preceding the operation.

Cable tensions expected during the course of the operation were calculated on the basis of a profile of the


VITAL STATISTICS
What . . . 39,200-ft, rubber-insulated, monel metal-shielded, steel-armored submarine cable 3/c, 300 Mcm, 25 kv phase to phase
Where . . . From Anacortes, 70 mi north of Seattle, 24,800 ft west to Decatur Island; from Decatur Island 11,000 ft west to Lopez Island
When . . . Laid April 16-17, 1951
Why . . . To carry 3,000 kva of Columbia River power to 1,200 customers of Orcas Power and Light Co on the San Juan Island group in Puget Sound
How Much . . . Cost of cable $422,500. Estimated installation cost $100,000
DECATUR ISLAND
ANACORTES
FIDALGO BAY
LOPEZ SOUND
FIDALGO HEAD
FIDALGO SUBSTATION
LOPEZ ISLAND
CENTER ISLAND
BURROWS ISLAND
FIDALGO ISLAND
ALLAN ISLAND
Lake Campbell
ROSARIO STRAIT
LOPEZ SOUND
DECATUR ISLAND
ROSARIO STRAIT
LOPEZ ISLAND
0'
100'
350'
FIDALGO SUBSTATION
2.0 Miles
1.6 Miles
4.6 Miles

1 **POWER SERVICE for the San Juan Islands group in Puget Sound consists of two lengths of submarine cable connected by a stretch of overhead transmission line. Ultimate carrying capacity of the cable under water is 20,000 kva**

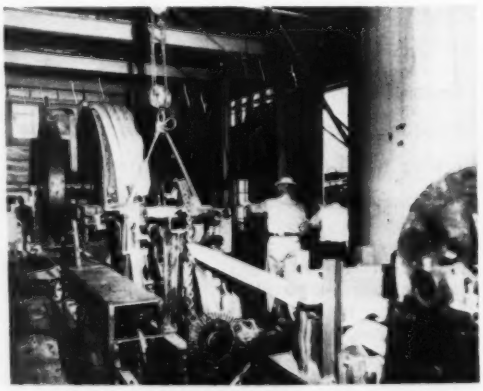
This Is How the 7½-mile Cable Was Laid in Puget Sound

bottom along the proposed path. The angle at which the cable should leave the barge was computed to serve as a check during the actual laying. This angle and corresponding tension must be maintained to prevent slack in the cable as it is being paid out. Otherwise, any slack in the cable might result in its piling up and kinking on the bottom.

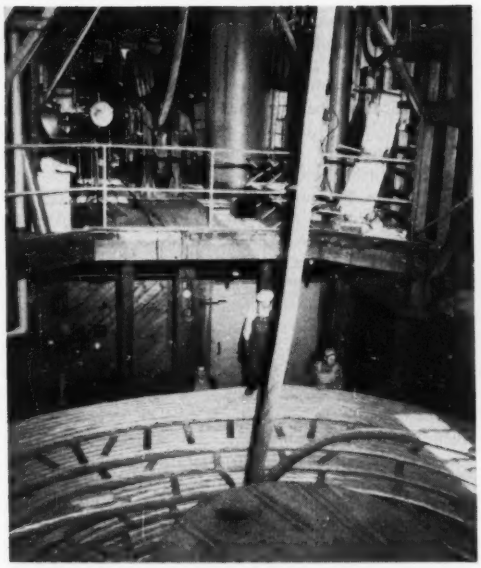
Bonneville crews, who had had no previous experience with submarine cable, held a trial run in the waters of Lake Washington at Seattle five days before the actual laying, using an old piece of cable to familiarize themselves with the equipment to be used. A dry run with a small boat over the actual course was also made to check navigational control, radio communication, and recording procedures. The value of these trial runs was realized during the actual laying operation.

Equipment . . . Major item of equipment was the cable laying barge "Puget Power," which BPA rented from Puget Sound Power and Light Co in Seattle. Built by Puget for the specific purpose of laying submarine cable, the barge contains two 34-ft circular wells forward in tandem, and equipment for carrying the cable out of the hold and over the stern. Tension on the cable as it leaves the ship is controlled by adjustable brakes on a large tension drum around which the cable makes four complete turns. Rental for the barge was on the basis of a $9,000 charter fee, plus $200 per day while at dock in custody of BPA, $500 per day during loading away from the Puget dock, and $1,000 per day during actual laying operations. Propulsion was provided by three tugs—one tug leading the barge and one tug positioned on each side of the stern of the barge.

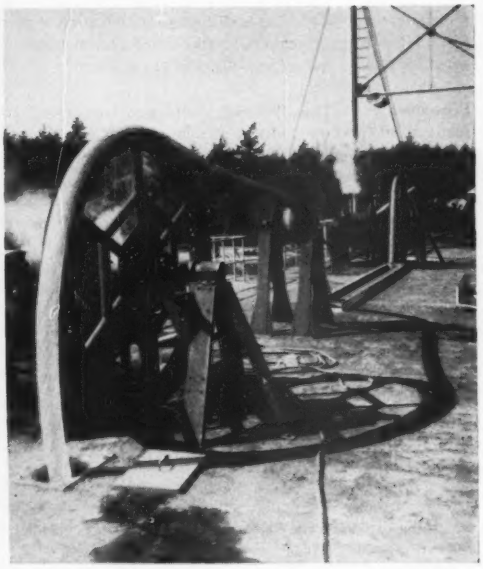
Instrumentation on the bridge of the barge included a cable tension meter, tension drum revolution counter and cable speed indicator which read directly in miles per hour, and an indicator showing desired cable tension. This last indicator was adjusted continually during the laying to correspond with tensions computed for the depth and amount of cable paid out. These instruments,



4 **CONTROL OF CABLE TENSION is by two men operating adjustable brakes on large tension drum. Center foreground is an adjustable retarding device which maintains some tension on the cable as it feeds onto the tension drum to assure sufficient friction on the drum to prevent slipping. Heat from tension brake is dissipated in a water bath**



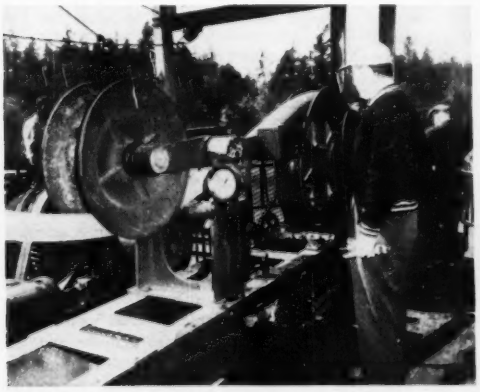
2 WINDING OUT OF WELL, cable goes up over a sheave and back down to constant tension device before feeding onto large tension drum in rear. Steel armor, which has tendency to untwist as cable is reeled into well, tightens as cable is taken out. Men remove wood blocks as fast as they are freed. Note intercom station and ship p.a. system speaker



3 MINOR MODIFICATION of slot in barge permitted handling one continuous length in two wells. Cable was coiled in forward well, passed over near sheave and down through slot to bottom of aft well, up through slot, down to tension drum. When aft well emptied, cable carried smoothly up through slot, ran directly from forward to aft sheave

plus communication equipment, were located aft and topside, directly behind a plotting table and a recording table.

Communication equipment to coordinate the efforts of the 84-man crew on the job included two-way radio to the towing tugs, two-way ship-to-shore radio to navigation control parties on a different frequency channel, and



5 AMOUNT OF CABLE TENSION is measured by this arrangement of an idler sheave between two sheaves supporting cable as it goes over the stern of the barge. Idler arm is connected to a hydraulic pistion which transmits amount of cable tension directly to the gage above and to the cable tension meter located on the bridge of the barge

6 MOST TIME-CONSUMING OPERATION was pulling off enough cable to reach to shore at the end of the run. Cable was pulled out of the water by a movable crane; then about 700 ft was pulled out of cable barge with a snatch block and winch line and coiled on the flat barge. Cable was cut with a hacksaw and pulled ashore by a shore winch

a complete public address and intercommunication system aboard the barge. Speakers in this latter system were located topside, in the cable wells, and at the stern.

Procedure . . . The 39,200-ft cable was transferred directly from the nine gondola cars in which it was shipped to the two wells of the barge, passing over an 8-ft diameter sheave suspended by a portable crane. Roughly 28,000 ft were put in the forward well, then the cable was taken up over a sheave and down into the second well, where the remaining length of about 11,000 ft (the amount required for the first, shorter run) was coiled. From here it passed up over another large sheave directly above the center of the coil and back down into some guiding and restraining sheaves before being passed four times around the tension drum. Rotational speed of this drum was what was shown in miles per hour on the control bridge during the laying operation.

After leaving the drum the cable passed over two sheaves and under an intervening idler sheave which measured tension by a hydraulic piston arrangement. From here it went over the stern, guided by a flaring shoe which had painted on it an angular scale. Thus the angle at which the cable left the barge could be observed accurately and without difficulty.

After the barge was put in position for the beginning of the run a hand line was flown out the 350 ft from shore by a helicopter which was standing by for photographic purposes, and a shore cable pulled out to take the end of the large cable ashore. After the end was anchored the barge was towed to the opposite shore at speeds up to 3 mph, the cable being paid out under the pre-calculated tensions.

Navigational control . . . The path followed by the barge was checked and maintained by two methods. Direct control was by radio to the tugs from a navigator on the barge who determined the course and corrections by observations of two on-shore targets. These were placed on the projected path one behind and above the other so they were lined up only when the barge was exactly on course.

The second method was an elaborate triangulation system utilizing on each shore two widely-separated transit crews with radio communication to the barge. Angular readings synchronized from the barge at 2-min intervals were radioed to the barge and plotted to determine exact location. This provided 2-min checks on the position of the barge, and also a permanent record of exactly where the cable was laid.

Maximum deviation from true course during the first day's 11,000-ft 50-min run from Lopez to Decatur Island was 150 ft, average variation 50 ft. On the 24,800-ft, 98-min run from the mainland to Decatur Island, deviation reached 450 ft, average variation was about 150 ft. Cable tensions on the first run, with depths up to 60 ft, reached 3,900 lb; on the second run with depths up to 325 ft, 5,700 lb. Design of the cable is such that it could stand over 30,000 lb tension without danger of damage.

When the barge reached the end of the run it was anchored and two flat barges brought up astern to take on enough additional cable to reach to the shore terminal. The cable immediately behind the cable barge was picked up and laid along the edge of the flat barge deck, then a snatch block and winch line used to draw out and coil on the deck the required length before the cable was cut. The end was pulled ashore with a line from a shore winch, anchored, and each conductor given a 15-min, 50-kv dc test before being taped to await completion of the terminal sometime this summer. A length of about 2,500 ft left over is being stored locally where it will be available in case of failure or accidental damage to the cable. Less than 600 ft of extra length was required for deviations from the desired course on the two runs between the three islands.

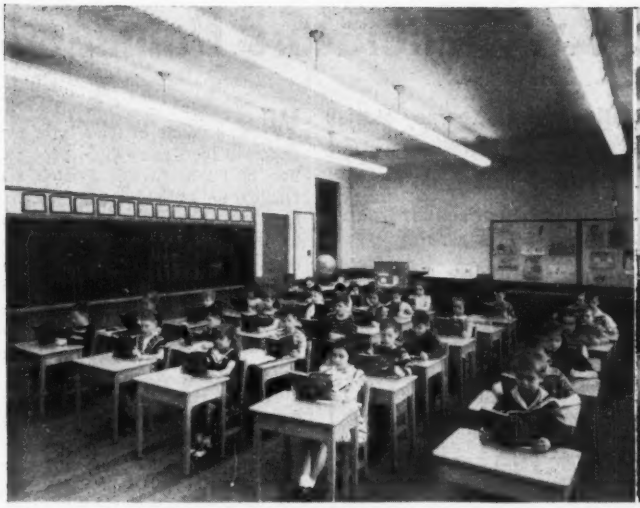
The 20,000-kva carrying capacity of the cable under water is limited to 15,000 kva by the shore ends which are above low water level. This is still so much greater than the estimated load to be carried for many years to come that it has caused no concern. If and when the additional capacity is needed it can be obtained by splicing on a section of larger lead-covered cable below the low water level.

Lead Alloy Sheaths Stand Greater Bending Stresses

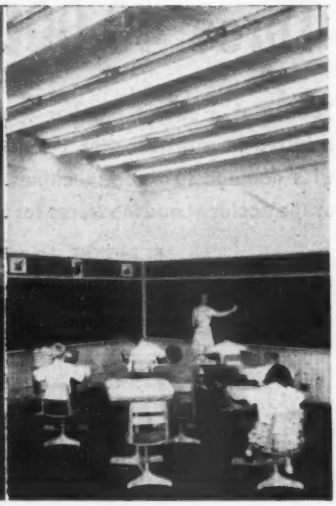
C. E. BETZER
Senior Engineer
Line Design Division
Engineering Department
Commonwealth Edison Co, Chicago, Ill.

Arsenical lead alloys, adopted by Commonwealth Edison Co for sheathing on 4 and 12-kv, three-conductor cables of the larger sizes and on all 69 and 138-kv cable, were developed in cooperation with various cable manufacturers to permit daily loading of the underground cable lines closer to the capabilities of the insulation. Cable troubles in the past have been due largely to the failure of the lead sheaths to protect the interior of the cable from air and moisture. Many of the openings through the sheaths were caused by fatigue cracking resulting from the thermal expansion and contraction of the cable produced by the daily load cycles. These arsenical lead alloy sheaths can withstand about three times the amount of slow bending as can lead sheaths.

For equal sheath life in bending, a 500-Mcm, three-conductor, 12-kv, shielded cable with alloy sheath can carry about 22% more current than the same cable covered with a lead sheath. This means that the required carrying capacity can be obtained by using cable containing less copper and lead than was formerly used, or required carrying capacity can be obtained by using fewer cable lines where a group of underground cables feed a given load center.



IES STANDARD of 30 ft-c is exceeded with three rows of two-lamp luminaires suspended by 12-in. hangers. Light with the new fixtures is 35 to 40 ft-c as contrasted with 7 to 10 ft-c from old units. Walls and ceilings were repainted



SIGHT-SAVING CLASSROOM with 80 ft-c has 8 rows short way across room, and one row along wall at 90 deg angle

Knoxville Lights Up Its Schools

Minimum standard of 30 ft-c is established. New schools will have 80 ft-c in every classroom

CLYDE O. CARPENTER, JR, Commercial Manager
Knoxville Utilities Board, Knoxville, Tenn.

Demonstrations convinced Knoxville school authorities of what constitutes adequate classroom lighting and as a result they have established a minimum standard of 30 ft-c of maintained high quality lighting for all classrooms in the city's schools. All of the 574 classrooms of the 40 grade and high schools have been relighted to maintain 35 to 40 ft-c with three continuous rows of two-lamp louvered luminaires having plastic side panels suspended on 12-in. hangers. Ceilings are painted white and walls in various pastel colors.

One sight-saving classroom has been provided with 80 ft-c of high quality lighting. Knoxville is building eight new schools and all are being equipped for the same intensity of maintained lighting in every classroom.

Luminaires used for sample installations were types designed by various manufacturers for classroom use. In some demonstration rooms there were two rows 24 ft long and in others three rows 28 ft long.

By comparing these various installations, including measurements of incident light, it was determined that two rows could not be expected to produce the minimum intensity in service of 30 ft-c without an excessive and impractical amount of maintenance. It was found that the three rows would provide more than the minimum required and, in addition, would produce more comfortable illumination with lower brightness contrasts. Hence, the adoption of the three-row installation as standard.

Sight-saving Classroom . . . In the "Sight-Saving" classroom, sponsored by the local Lions Club, the maintained light intensity of about 80 ft-c is produced by 46 louvered luminaires with two 40-watt lamps, surface mounted. It is a corner room 24 ft by 24 ft 10 in. with a ceiling height of 12 ft 7 in. Eight continuous rows of five units run the short way of the room with one row of six units along one wall 90 deg to the eight rows.

Painting is with flat white on the ceiling and walls above the moulding, flat light yellow on the two walls where there are windows and a flat light green on the walls opposite the windows. Wainscoting, doors, window and door casings are semi-gloss light gray. Chalk boards are green.

This modern lighting is in sharp contrast to the 7 to 10 ft-c of low quality illumination which prevailed before the relighting was undertaken. E. L. Adcock, business manager of the city school system, Leslie B. Pierson, illuminating engineer, Knoxville Utilities Board, and Raymond W. Worsham, maintenance supervisor for the schools, cooperated in making the study on lighting improvement.

Three 40,000-Kw Generators Damaged

Failure of a circuit breaker operating rod at Kearney station resulted in a disturbance causing a multiple generator outage with damage to three machines. Outlined here is an analysis of the accident and measures for the prevention of similar trouble

R. DOEHNE, Electrical Plant Engineer
Public Service Electric and Gas Company, Newark, New Jersey

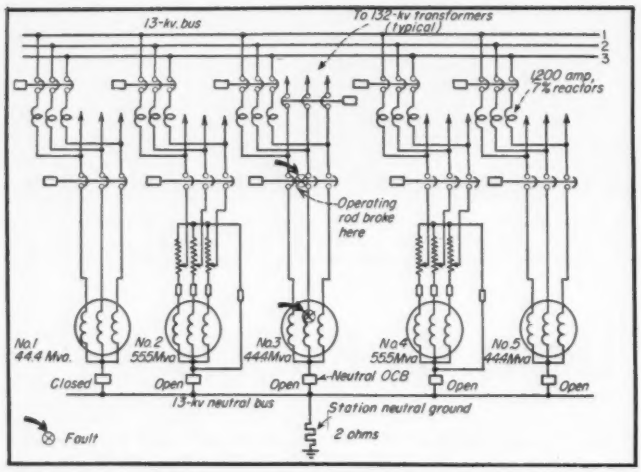


FIG 1—AT 5:33 A.M. generator No. 3 was synchronized on the bus. Several seconds later it was tripped off the line by its phase 2 differential relays. Inspection and insulation tests showed no reason for tripping

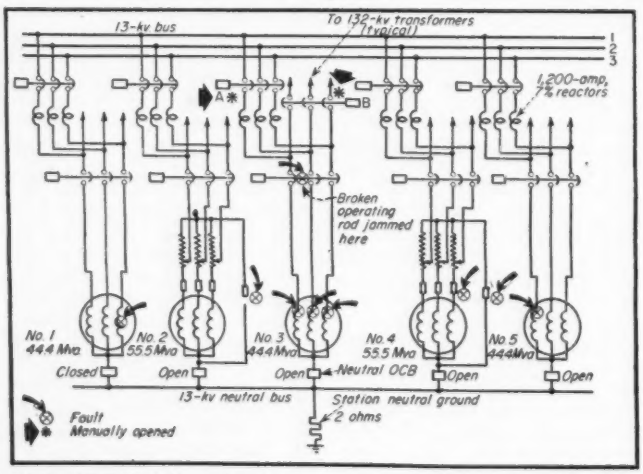


FIG 2—AT 7:29 A.M., with units No. 1, 2, 4, and 5 on the bus, No. 3 was synchronized again. Immediately generators No. 1, 4, and 5 came off the bus. When its main breaker could not be opened, No. 3 was cleared from the bus by opening transformer and group bus oil circuit breakers

Winding failure of three large generators at the Kearny Generating Station of Public Service Electric and Gas Co on December 28, 1950, has been attributed to overvoltage caused by the drifting out of synchronism of a generator connected to the bus on one phase only. Fracture of a steel operating rod between pole units of an oil circuit breaker allowed two poles to fall open and prevented tripping of the breaker later.

The five generators affected by the disturbance were installed in 1925 and all had their original field and armature windings. Two other generators at Kearny totalling 110 mw, not being connected to the station bus, were not involved.

Operating Difficulties . . . Prior to the trouble, No. 1 generator was running alone on the bus with its neutral circuit breaker closed. All the 13/132-kv transformers were in service. At 5:33 A.M., as shown on Fig 1, No. 3 generator, with its neutral breaker open, was brought up in the normal manner and synchronized. Several seconds after the breaker was closed, No. 3 generator tripped out all around on generator differential relays. Inspection of the equipment and various insulation tests did not reveal the fault and the machine was brought up a second time for synchronizing. In the meantime, generators No. 2, 4, and 5 had been cut in on the bus. At 7:29 A.M., as shown in Fig 2, No. 3 generator was again synchronized. Immediately, dif-

Generator Damage Caused by Circuit Breaker Rod Failure

Generator No.	Capacity (Kva)	Damage to Generator
1	44,444	Armature, field and laminations burned
2	55,500	External neutral connection burned open
3	44,444	Armature, field and laminations burned, bedistal insulation failed, journals heated
4	55,500	External phase and neutral leads burned, porcelain insulators cracked
5	44,444	Armature, field and laminations burned

By Circuit Breaker Failure

ferential relays operated on all generators except No. 2, but the breakers of No. 3 generator failed to open.

Efforts to trip No. 3 generator main breaker from the control switch were unsuccessful and the machine was cleared from the system by opening the group and transformer breakers of this machine. The field breaker was then opened by operating its control switch. The system was now clear of trouble and No. 2 generator was still in service. The load that was being carried by the machine that tripped out was immediately picked up by other generators in the interconnected system and there was no interruption of service.

Damage . . . After fires at various points were extinguished, a survey of the equipment showed No. 1, 3, and 5 generator windings were damaged; No. 4 generator leads had flashed to ground in a bus run; and No. 2 generator neutral lead had flashed to ground and burned off. Examination of No. 3 generator main breaker disclosed the broken operating rod and the abnormal position of the clevis which prevented full opening of the phase 1 pole unit. The arrangement of these breakers is shown at the left of Fig 3 and at the right are two enlarged views showing the mechanism at the point of failure; one in the normal closed position and the other in the jammed position.

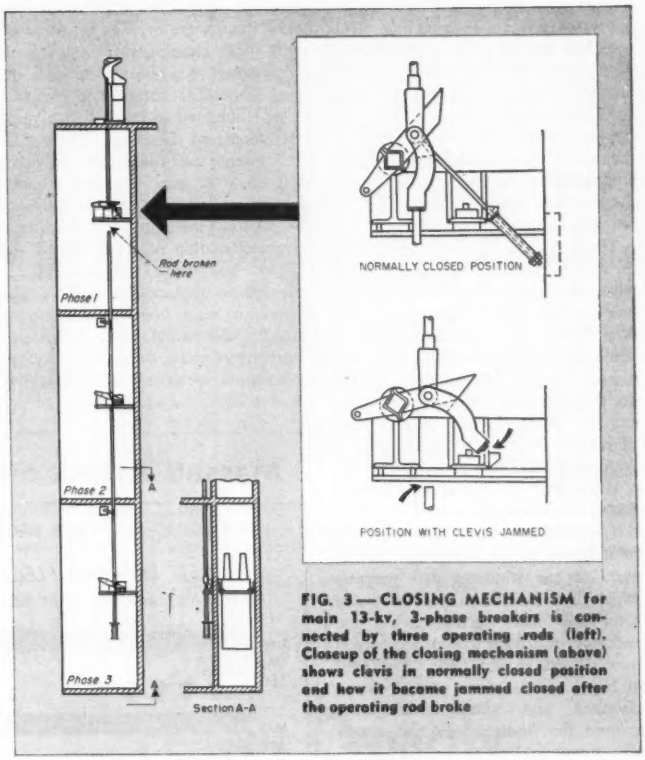


FIG. 3 — CLOSING MECHANISM for main 13-kv, 3-phase breakers is connected by three operating rods (left). Closeup of the closing mechanism (above) shows clevis in normally closed position and how it became jammed closed after the operating rod broke

Analysis of Trouble . . . Analysis of all the available information indicates that the trouble was initiated by failure of the operating rod on No. 3 generator main circuit breaker. This rod broke several seconds after the machine was synchronized at 5:33 A.M., which left the machine tied to the bus on phase 1 only. Since the neutral breaker was open, there was no path for synchronizing current to flow, and the machine drifted out of step. This caused No. 3 generator's phase 1 to 2 and phase 1 to 3 voltage vectors to rotate around phase 1 of the system as an axis with the result that approximately three times normal voltage to ground was imposed on the phase 2 and 3 terminal coils. This apparently caused No. 2 phase of the generator winding to fail to ground. Relays cleared the unit.

At 7:29 A.M., there were four machines on the bus when No. 3 generator was connected to the bus on one phase. As this damaged breaker was closed, the clevis, having no operating rod to restrain it, was thrown to the jammed position as shown in Fig 3. Again the generator went out of step and its voltage vector rotated with respect to the system. This time, however, the generator was defective on phase 2 and the breaker mechanism could not open, with the result that phase 2 and 3 bus voltage rose considerably above normal and heavy current flowed in the two-ohm neutral resistor. This overvoltage caused No. 1 generator to fail to ground on phase 3 and it immediately cleared on differential relays, thus removing the only neutral connection from the bus. The high voltage surges which occur with an arcing ground on an ungrounded system caused the winding failure of No. 5 generator and the flashovers on No. 2 and 4 generator leads. No. 2 generator did not trip when its neutral lead flashed to ground and burned off because the fault was outside the generator differential relay protection zone. Automatic oscillograms of both occurrences confirm the above explanation.

Details of Damage . . . The flashover on No. 4 generator leads blew down about 40 ft of transite covering and chipped the porcelain on several insulators. However, the damage to the leads was not serious and after cleaning the smoke and copper par-

ticles from the insulators, this machine was returned to service in less than eight hours.

No. 2 generator was taken out of service after the evening peak load to repair the neutral lead between the generator and autotransformer. This lead had flashed to ground at a roof bushing and the arc burned off the bottom of the bushing and the cable connection, burned holes in the building steel, and set fire to the paint on the wall. The bushing was replaced with a section of insulated cable and the machine returned to service for the next morning load.

From No. 1, 3, and 5 generators the end bells and fields were removed with the hope that temporary repairs would make it possible to return some of this capacity to service while new coils were being manufactured. Because of the extent of the arc and fire damage to the windings and the damage to the iron laminations this was not feasible, and all three generators had to be completely rewound and sections of iron laminations had to be replaced.

The field of No. 3 generator was returned to the manufacturer for repairs to the windings and journals which had been damaged by heavy rotor and shaft currents when the pedestal insulation failed and arced over on the second fault. The field of No. 1 generator was partially open circuited and when investigation showed the insulation in bad condition, it was decided to remove and reinsulate the windings of both No. 1 and 5 fields. The copper was replaced in the outer coil of each pole on all three fields when a number of cracks were discovered in the end turn copper of these coils.

No. 3 generator was returned to service April 1, No. 5 was scheduled for the first week of May, and No. 1 will be in use by the end of June.

Preventive Measures . . . This occurrence at Kearny has been thoroughly studied from all aspects to determine what measures could be taken to prevent future trouble of this nature. Following are three changes made and two changes considered:

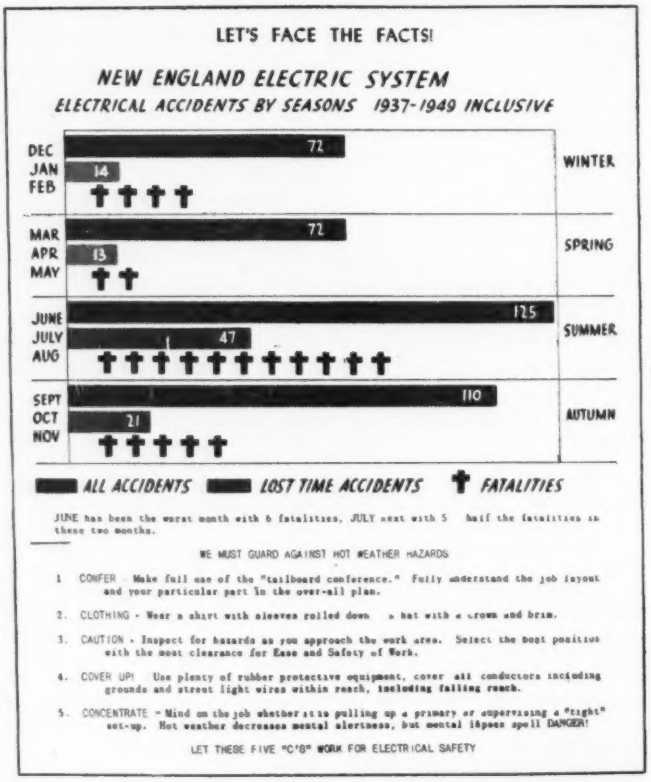
Our practice of synchronizing incoming generators with the neutral breaker open was established originally to avoid circulating currents which flow when two machine neutrals are connected. However, closing the neutral breaker prior to and during synchronizing is more desirable because it effectively tests the machine before the breaker is closed and will hold the machine in step even though the breaker is closed on only one phase. Instructions have been issued to all stations to close the neutral breaker before synchronizing a generator and to open it when generator current shows on all phases.

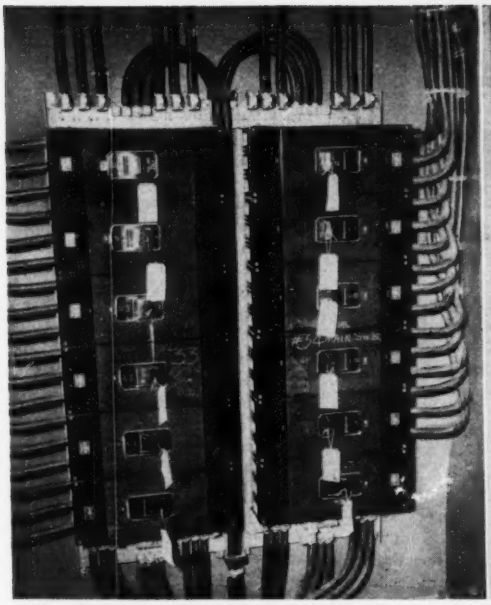
Although the broken circuit breaker rod made of one inch double extra heavy iron pipe has been investigated by various metallurgists no conclusive explanation of what caused the failure has been obtained. It is planned to replace the rods on the generator main breakers as soon as material can be obtained. To prevent jamming of these breakers if another rod should break, a small device has been welded to each clevis to prevent its being thrown to the lock position. This is the first rod failure on 27 breakers in 25 years of operation.

The sequential tripping scheme in use at Kearny, which prevents opening of the field breaker until the main breaker is fully open, probably accounted for the extensive iron damage on No. 3 generator. When the main breaker did not open on relay action, the field breaker could not trip and field current, strengthened by the voltage regulator, was maintained until the field breaker was manually opened. Wiring changes have been made so that the main, field, and neutral breakers of a generator now trip directly from the generator multitrip relay.

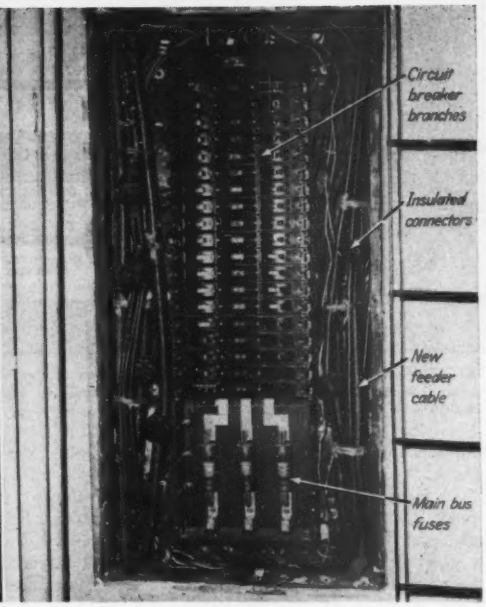
Consideration is being given to the installation of surge protectors on all generator terminals and the installation of neutral circuit breakers on generators with unconnected neutrals.

Massed Attack on Summer Accidents


LET'S FACE THE FACTS!
NEW ENGLAND ELECTRIC SYSTEM
ELECTRICAL ACCIDENTS BY SEASONS 1937-1949 INCLUSIVE
DEC JAN FEB
72
14
WINTER
MAR APR MAY
72
13
SPRING
JUNE JULY AUG
125
47
SUMMER
SEPT OCT NOV
110
21
AUTUMN
ALL ACCIDENTS
LOST TIME ACCIDENTS
FATALITIES
JUNE has been the worst month with 6 fatalities, JULY next with 5 half the fatalities in these two months.
WE MUST GUARD AGAINST HOT WEATHER HAZARDS
1 CONFER - Make full use of the "tailboard conference." Fully understand the job layout and your particular part in the over-all plan.
2. CLOTHING - Wear a shirt with sleeves rolled down a hat with a crown and brim.
3. CAUTION - Inspect for hazards as you approach the work area. Select the best position with the most clearance for Ease and Safety of Work.
4. COVER UP! Use plenty of rubber protective equipment, cover all conductors including grounds and street light wires within reach, including falling reach.
5. CONCENTRATE - Mind on the job whether it is pulling up a primary or supervising a "right" set-up. Hot weather decreases mental alertness, but mental lapses spell DANGER!
LET THESE FIVE "C'S" WORK FOR ELECTRICAL SAFETY

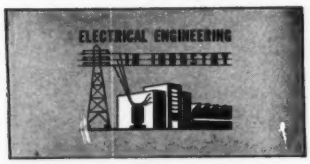


MAIN DISTRIBUTION SWITCHBOARD SECTION showing circuit breaker branches and new heat resistant wire feeders serving lighting distribution panelboards on upper floors



LIGHTING DISTRIBUTION PANEL showing heat resistant feeder cables in gutters with insulated connection taps for panel feed. Note main bus fuses and circuit breaker branches

Heat Resistant Wire Doubles Store's Feeder Capacity

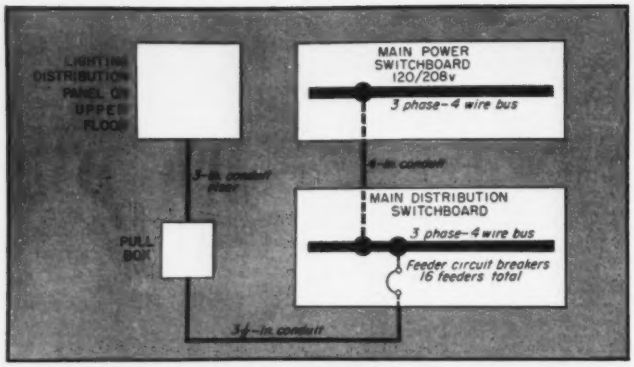


How one large department store saved material and manhours when rewiring for increased loads with heat resistant wire

Replacement of rubber covered feeders by heat-resistant cable in a 350,000 sq ft, 11-story section of G. Fox & Company's Hartford, Conn., department store solved a major problem in distribution. Originally this building was provided with interior service on the basis of 3.2 va per sq ft. By installing asbestos insulated cable to care for increased loads, service became available on the basis of 7.2 va per sq ft, and the existing 3-in. and 3.5-in. (added in a few cases) steel riser conduits were largely used.

Since the man-hours required in wiring an installation are proportional to the weight of materials used, the employment of 500,000-cm phase wires in this modernization job on typical feeder risers without increasing the conductor cross-section was of much advantage. In addition to using the same size of steel conduit as before in the risers, it was also possible to provide the same size of fittings. Smaller sizes of cable could have been installed with correspondingly smaller fittings had the previously anticipated maximum loading been regarded as the optimum expected in future. Since greatly increased carry capacity was obtainable by using heat-resistant cable, it was deemed best to provide for still further load growth by purchasing 500,000-cm phase conductors. Time was saved in replacing cable without increasing the size of conduit risers in general No walls had to be repaired in the building, and there were no weakened beams or partitions to strengthen.

The initial installation in this store was made about 30 years ago. The feeders were 3-wire single-phase, 110-220-v, using three 500,000-cm conductors. The neutrals were grounded at the riser entrances and not in the riser circuit, except in serving the base-



DISTRIBUTION LAYOUT OF FEEDER SYSTEM serving section of department store. By using existing feeder conduits, for new higher capacity heat resistant feeders, $18,000 was saved for conduit alone. The new capacity per phase is 470 amp

ment and first floor. For these floors 2-phase 5-wire distribution was employed, using five 4/0 per conduit.

Since the initial installation was made, the Hartford Electric Light Co, which supplies most of the electrical service to the store, has been replacing much of its downtown secondary distribution with the 120/208-v network system. A typical store 120/208-v feeder circuit now consists of three 500,000-cm asbestos-insulated varnished cambric copper conductors in cables plus three No. 2 conductors for neutrals. These neutrals are grounded at the service entrance and not in the riser circuit.

The old installation of single-phase 500,000-cm conductors had a carrying capacity of 77 kva per circuit (320 amp). With the heat-resistant cables now in service this capacity was increased to 169 kva (470 amp). Had ordinary rubber-covered cable been used, a maximum capacity of 380 amp per phase would have been attainable without increasing the diameter of the conduit riser, and with conductors insulated with varnished cambric, 405 amp per phase would have been secured. The advantage of being able to utilize the initial riser conduits without replacing these with larger sizes at heavy material cost as well as the expense of construction involved in the building was striking. In general the old cables were pulled out of the conduit risers in sections and easily replaced by the heat-resistant cables. The load increase called for a present capacity of 400 amp per phase, and this was brought to 470 amp by resorting to the heat-resistant cable. Maximum copper temperature allowed is 110 C.

The distribution system in the older building is fed from a main switchboard in the sub-basement from which 16 feeders are run to the floors served in four sets of risers. Each feeder is equipped with a main circuit breaker. The feeders are tapped to distribution cabinets by laterals connecting with the risers, and local floor branch circuits are provided with circuit breakers in the cabinets. This arrangement simplifies the protection against overloads and avoids de-energizing the feeder in case of branch circuit trouble on individual floors.

The original wiring installation cost about $29,000 in 1917. The new installation costs about $60,000, but if it had been necessary to replace the riser conduits with larger sized (probably 4-in.) steel pipe, the cost would have been $18,000 more for conduit alone. Such a course would have called for about 5,000 ft in larger diameter laterals from switchboard to risers and another 5,000 ft. in vertical runs. The store operates a 1,250-kva steam turbine generating unit with an exhaust steam heating load, and a representative day load on the Hartford Electric Light Company's supply is 2,000 kw. The total store area, including a new building adjoining the older structure equipped with heat-resistant cables in 1950 as described above, is 546,293 sq ft. Two 11-kv feeders are provided for the Fox service from the utility company, and three underground vaults and 5,000 kva in transformers are in operation.

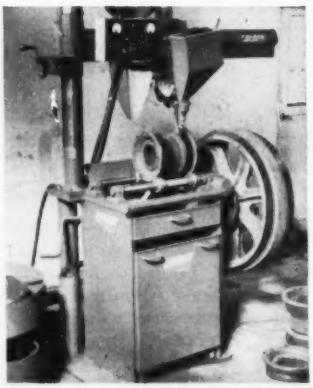
Automatic Welding Conserves Parts

Problems of conserving such serviceable tractor parts as track rollers and idlers were solved at the Peoria Tractor & Equipment Co, Peoria, Ill., by installing an automatic submerged arc electric welding machine in the repair shop.

Essentially the same as the more familiar coated rod welding, done by hand, the submerged arc process uses bare (uncoated) wire electrodes producing an arc with the base metal under a protective covering of molten flux. In either instance the molten metal is protected from the atmosphere.

Worn track rollers, idlers, carrier rollers, wear plates, cutting edges, bits, etc, can be very successfully restored to size in record time and at surprisingly low cost.

Submerged arc welding is extremely fast, as 20 in. of weld per min can easily be accomplished. Because the welding head controls the arc voltage, current, and rate of electrode feed, welds are very uniform in width and depth of penetration as well as very smooth in appearance.



Caterpillar Tractor Co photo

TRACTOR ROLLERS can be rebuilt ready to be put back on the machine within 24 hours by means of automatic submerged arc welding equipment

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN

New Laminate Will Reduce LCR Equipment Failures

M. L. MANNING
Pennsylvania Transformer Co
Canonsburg, Pa.

R. L. GRIFFETH
Mica Insulator Co
Schenectady, N. Y.

E. R. SHAWN
National Vulcanized Fibre Co
Wilmington, Del.

A new paper or fabric base, low-loss laminate, Pennsylite,* may be the answer to dielectric failure of load-ratio-control equipment in the field. In the past, such dielectric failures (commonly called electrical) were brought on by voids in the cured laminate structure. These voids are caused by residual solvents, by condensation products given off during impregnation, and by entrapped and absorbed moisture. The resulting high power factor and increased dielectric losses caused excessive internal heating and decomposition, with ultimate failure of the laminate.

Test Characteristics

That these failure-producing voids have been eliminated in the new laminate is shown by these reported test characteristics: 0.5% to 4% power factor at 60 cps; dielectric 60-cps voltage withstand strength parallel to laminations of 125 kv between ½-in. diameter pins spaced 3½ in. apart, and full waves impulse crest voltage strength of 335 kv; and complete resistance to delamination when exposed to 120 C for 36 hr. Other properties are listed in the accompanying table on page 97 which lists results of typical tests.

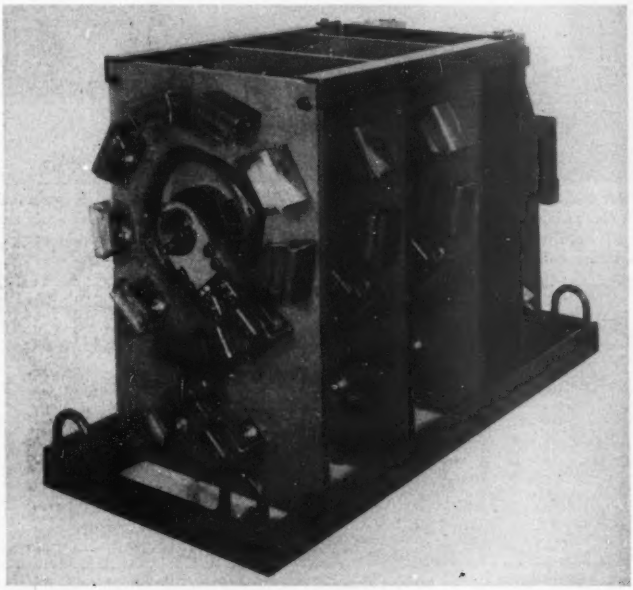
The laminate has been developed for Class A applications designed to withstand a hottest-spot temperature of 105 C. It is suitable for oil-filled transformer terminal boards and panels for tap changers used in step voltage regulators, load-ratio-control transformers and unit substations.

Development of this new laminate hinged upon satisfactory impregnation of fabric with low-loss thermosetting resins. Heretofore it has been found that threads of a fabric were much more difficult to impregnate than was paper. In the manufacture of this laminate, proper impregnation requires careful selection and processing of fabric to be used with low-loss resins.

Use of a low-loss, phenol-formaldehyde resin in combination with paper or fabric is desirable because volatiles and condensation products can be driven off prior to lamination. Sufficient plasticity and flow remain to provide a well-bonded structure using normal pressing conditions. The resulting laminate is almost completely free from occluded condensation by-products. Also, moisture absorption rate of the cured laminate is very low.

In evaluation tests of low-loss characteristics, a 60-cps power factor value of not more than 5% on ½ and 1 in. thick sheets at 20 C, using 4-in. diameter guarded electrodes, was set as the initial test for quality control in the "as received" condition. During development, the laminate was subjected to voltages up to 15-kv crest,

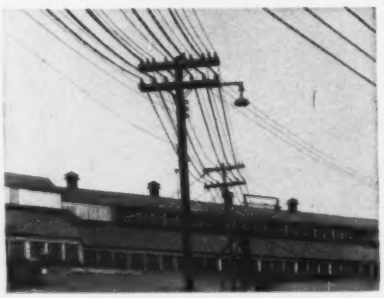
(*Continued on page* 97)

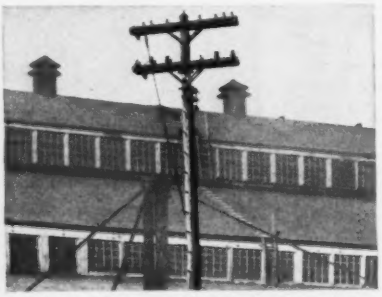


TAP-CHANGING-UNDER-LOAD switches mounted on a new low-loss laminate designed for a hottest-spot temperature of 105 C. The laminate should reduce dielectric failures in oil-filled transformer terminal boards and panels of tap-changing equipment. Typical electrical and mechanical test results are listed on page 97

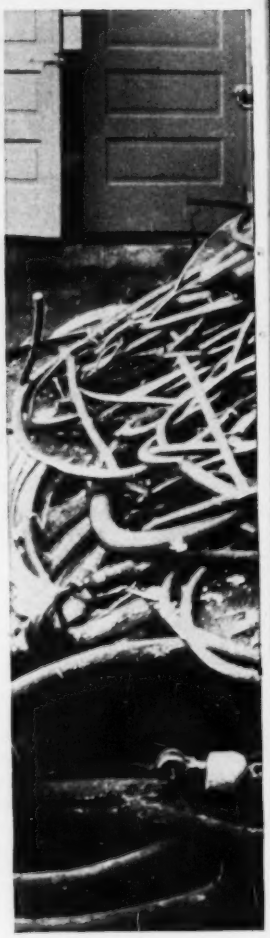
* Trademark of Pennsylvania Transformer Co.

MODERN G-E LOAD CENTER UNIT installed at the Traylor Engineering and Manufacturing Co., Allentown, Pa. This unit consists of a dry type transformer and switchgear, completely enclosed in steel. Power is received at 2400 volts and stepped down to utilization values. Note placing of unit in waste space under stairway.





BEFORE—AND AFTER! Here are photos of poles that carried the old 240-volt distribution lines, before and after the cables had been removed. The many low voltage cables have now been replaced by a 3-phase cable installed underground.

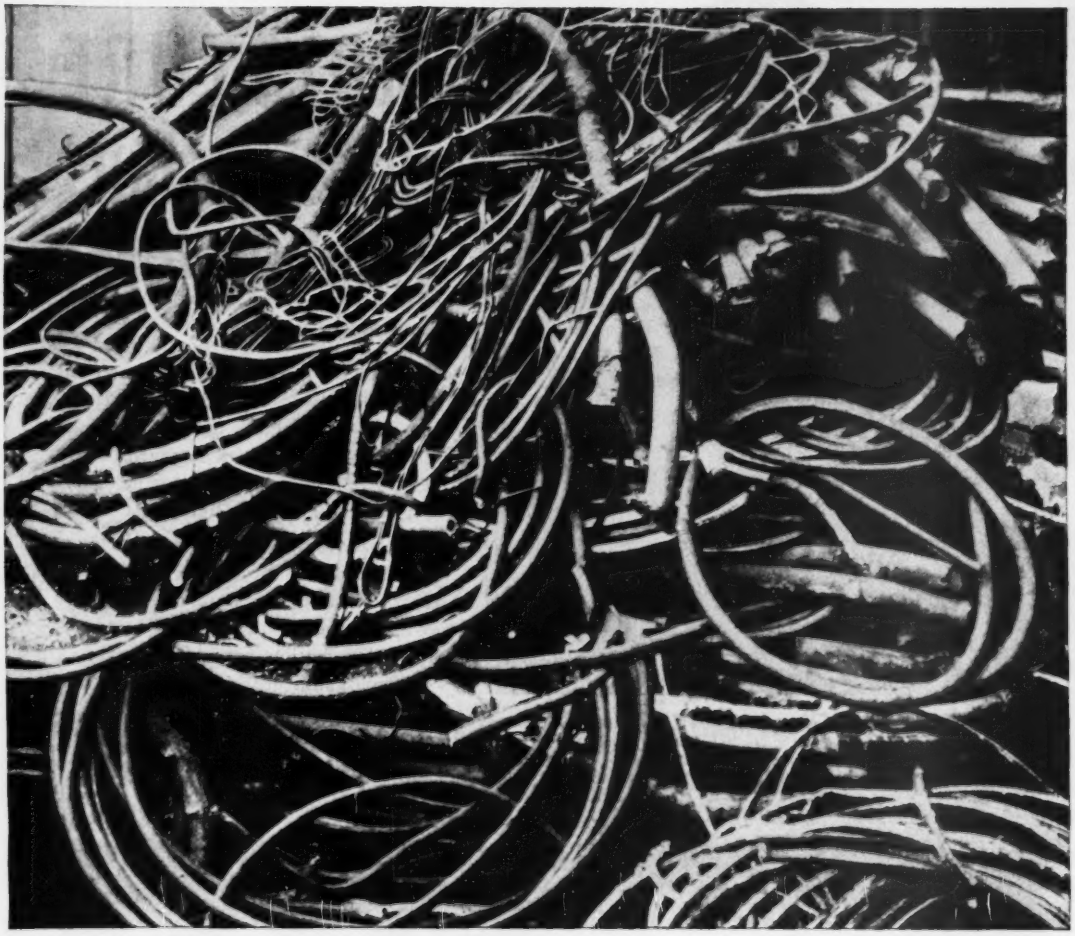


LOAD CENTER SYSTEM

Replacing an octopus of long, heavy 240-volt distribution lines, three small high voltage cables now carry all the power required for expanded, more efficient production at the Traylor Engineering and Manufacturing Co., Allentown, Pa.

If the old system had been continued, more than 10% additional copper would have been required to provide for expansion. This is more than the amount necessary for the new high-voltage cable, which will carry all the power required for years to come.

Today, power is distributed at 2400 volts to various G.E. Load-center unit substations like the one above, where it is stepped down to utilization values. Because load-center units are located close to the machines they serve, secondary feeders are kept short, saving expensive



SAVES TONS OF COPPER

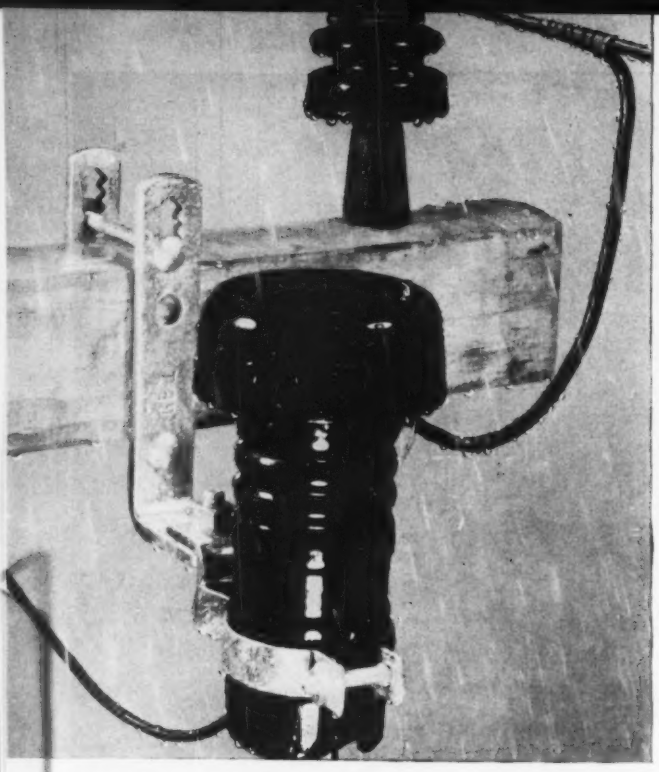
low-voltage copper. Although the new high-voltage lines are more than 90% smaller in size than the old low-voltage distribution cables, they carry considerably more power.

After the new load-center system had been installed, the pile of copper cable shown above was all that remained of the old outdoor, pole-mounted, 240-volt distribution system at the Traylor Engineering & Manufacturing Co. Over and above the salvage of vital copper in this cable, the Traylor Company actually saved copper in putting in its new high-voltage distribution system.

For complete information on this modern power supply system for your plant, write for Bulletins GEA-3592 Load Center Unit Substations and GEA-3758 Load Center Power Distribution. *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

221-75



General Electric Pellet Arresters give the same excellent protection to transformer windings in wet weather or dry, in low humidity or high, when new or after years of service. And their low sparkover voltage and low IR drop assure a degree of this protection unexcelled by any other distribution arrester.

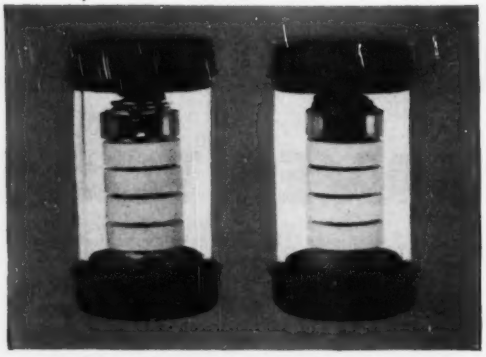
MOISTURE doesn't hurt this arrester

The General Electric Pellet Arrester has a unique valve element that is unaffected by service moisture—and gap electrodes that are sealed in dry nitrogen (N_2)—exclusive features that mean more enduring protection against lightning.

In addition, pellet arresters use inorganic insulation throughout—no internal fiber to "track", carbonize or wear away. Whether valve- or expulsion-type, no other distribution arrester is so unaffected by service moisture.

Write for Bulletin GEA-2975. Apparatus Department, General Electric Company, Schenectady 5, New York.

Valve Element Unaffected by Service Moisture! Efficient valve element is a column of lead peroxide pellets—pellets which are actually formed with water in a tumbling barrel (above). Moisture in service causes no change whatever in the unexcelled protective characteristics of this pellet valve column.



N_2-filled Gap Excludes Corrosive Moisture! Here's life-test proof: electrodes at left were sealed in dry nitrogen—those at right sealed in air, and both exposed outdoors under maximum rated voltage. Result: N_2-protected gaps are bright and clean; gaps sealed in air are discolored and corroded.

GENERAL ELECTRIC

New Laminate

(*Continued from page* 93)

when tested for power factor in accordance with ASTM designation D-150-47T after conditioning for 24 hr at 100 C. Even at this voltage the power factor of the laminate did not exceed 5%.

To determine thermal aging characteristics, the laminate was treated for 36 hr at 120 C. There was no tendency to split, delaminate, or discolor. Thus, heat resistance of the material was deemed satisfactory.

To evaluate the parallel-to-lamination dielectric strength, two ½-in. diameter studs were placed 3½ in. apart (center to center) on the laminate and immersed in oil at 82 C for 1 hr before voltage was applied. Audible and visible corona points, withstand and breakdown voltages were obtained for impulse and 60-cps potentials. These values are given in the accompanying table. To determine whether dielectric fatigue occurred, about 70% of the withstand 60-cps voltage was applied to test pieces for a several-day period. The ratio of full wave withstand impulse crest voltage to 60-cps withstand rms voltage (impulse ratio) is 2.68. Mechanical strength characteristics were established as listed in the following table.

Results of Typical Tests on New Laminate

Tensile strength	
Lengthwise	10,000 psi
Crosswise	8,000 psi
Flexural strength (flatwise)	
Lengthwise	18,000 psi
Crosswise	13,700 psi
Compressive strength	27,000 psi
Bonding strength	1,420 lb
Impact strength (Izod test)	
Edgewise	1.53 ft-lb
Flatwise	1.46 ft-lb
Moisture absorption (3x1x⅛-in. piece, 24-hr immersion in 25 C water)	0.4%
Power factor (60 cps) At 20 C, 4-in. diameter guarded electrodes	0.5 to 4%
Dielectric strength (½-in. diameter studs, 3½-in. on centers, ⅛-in. thick laminate under oil)	
Withstand voltage (60 cps)	125 kv
Breakdown voltage (60 cps)	130 kv
Visible corona voltage (60 cps)	110 kv
Radio influence voltage, at 50 kv RIL	50 μv
Impulse voltage (1½x40-μsec wave, positive polarity)	
Withstand	335 kv
Breakdown	360 kv
Impulse ratio	2.68
Heat resistance (continuous for 36 hr at 120 C)	Satisfactory*

Tests made on representative lots of laminate composed of fabric base and resins, ½ or 1-in. thick sheets unless otherwise specified.

* No delamination or blistering occurred.

Transformer Truck Fits All Tanks

J. B. BOWEN
Supt of Electrical Maintenance
San Diego Gas & Electric Co

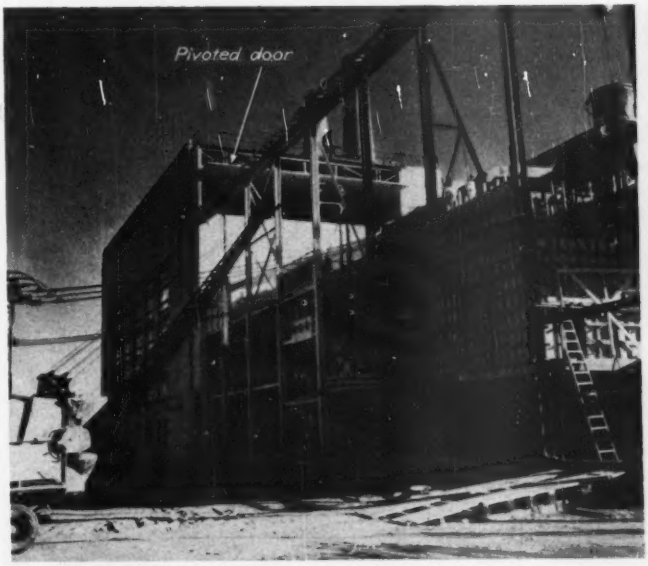
Adjustable for any size transformer up to 50 kva and adaptable to any type lug or other lifting dog or hanger is a one-man hand-truck designed and built by San Diego Gas and Electric. A lifting hook slides up and down in the slotted channel back of the truck, protruding far enough to hook under the conventional U-shaped hanger piece. For tanks with a dog welded on the tank, a ring attachment slips over the pin carrying member, and encircles the dog. Wedging action of the sliding member in the channel slot locks it in place.

Balloon tires provide enough bearing area so that the truck will not cut up a lawn. Weight distribution is such that the transformer is hardly tipped from the vertical.

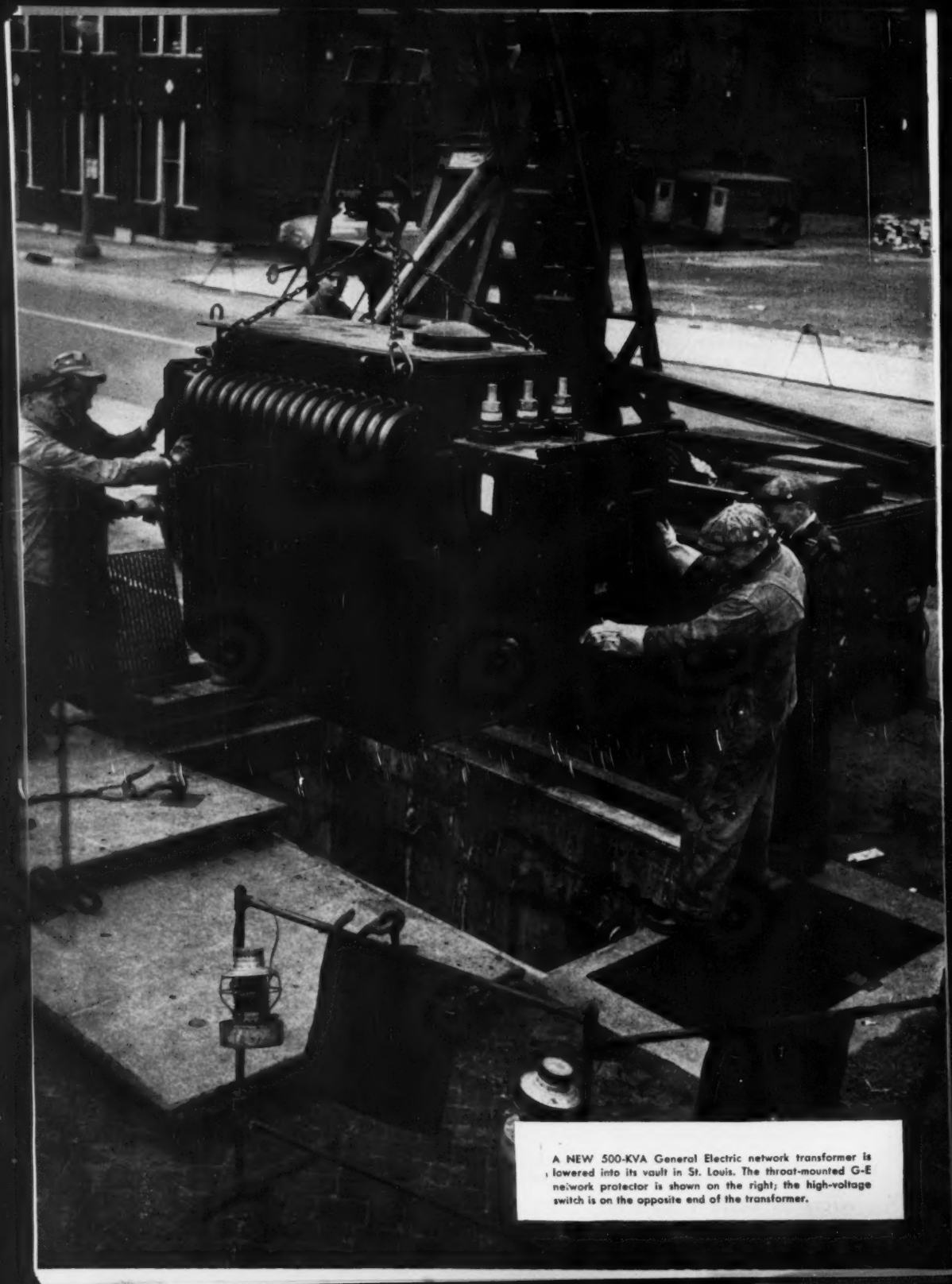
The truck is foldable so it can be carried in the back of a small truck.

TRANSFORMERS to 50 kva are held by ring and hook which slide in the slotted-channel-back of the truck

Indoor Crane Serves Outdoor Units



LONG, NARROW PIVOTED DOOR rotates on a horizontal axis to provide a passageway for an indoor crane to serve outdoor units. Idea was developed by station chief F. W. Bridler when an outdoor unit was added to El Paso Electric's Rio Grande Plant. Extended craneways and a door put in at working level allowed a transfer car to move the load inside, where the crane could pick it up again



A NEW 500-KVA General Electric network transformer is lowered into its vault in St. Louis. The throat-mounted G-E network protector is shown on the right; the high-voltage switch is on the opposite end of the transformer.

More Capacity for St. Louis' Network System

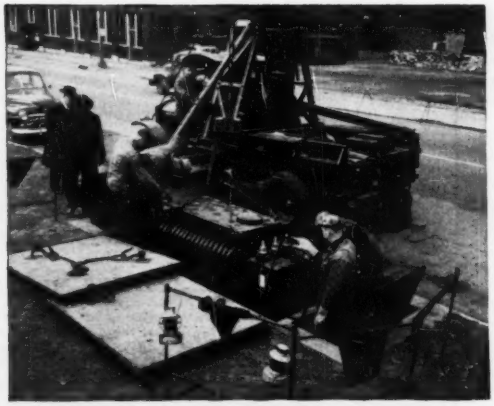
Installation of this G-E Network Unit demonstrates once more how a network eliminates headaches connected with load growth

It's an old story to users of networks, but still mighty impressive—the ease with which you can meet increased loads, once you have gone to a network system.

The place is St. Louis. The utility, the Union Electric Company. Load in the area around Clark Avenue and 15th Street had grown to the point where an additional transformer was needed.

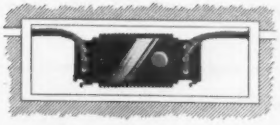
With a network, this addition was easy! A vault was constructed. A high-voltage feeder extended two blocks, from Market and 14th. The secondary cable brought into the vault. Then, with everything ready, and at the convenience of the construction crew, a new 500-kva transformer was installed—and connected during the daytime, with no interruption of service. With a total of three different high-voltage feeders serving the area, the one involved in this installation was killed while the new network unit was being connected. When all was set, the feeder was re-energized and the new transformer picked up its share of the network load.

With a network, service connections as well as low voltage grid connections are provided initially thus eliminating any need for rearrangement or reinforcement when a new transformer is added. In every respect, each added transformer represents an orderly step in system growth that was all automatically provided for when the network was first installed. *General Electric Company, Schenectady 5, New York*

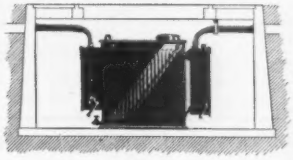


ALMOST IN PLACE! By using standard G-E network units, Union Electric Co. has kept vault construction costs to a minimum. Complete servicing of the transformer, switch, and protector can be done from the two ends—so that the vault can be made narrow enough to fit between sidewalk and curb.

Narrow, shallow vaults when you use G-E Standardized Network Equipment



With manhole openings at both ends, vault need be only 14' long, 4½' wide for a 500-kva transformer.



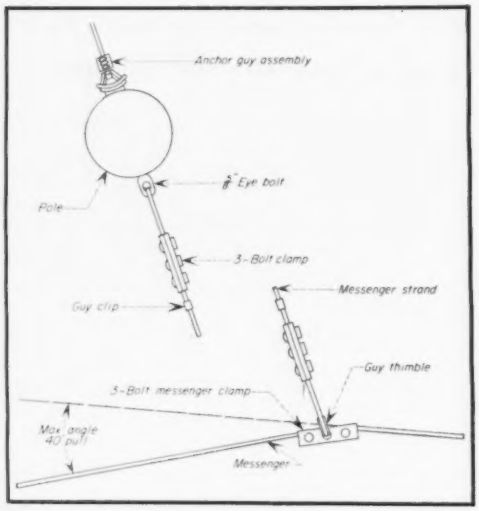
A vault depth of 7' below roof slab will provide sufficient room for maintenance and inspection.

GENERAL ELECTRIC

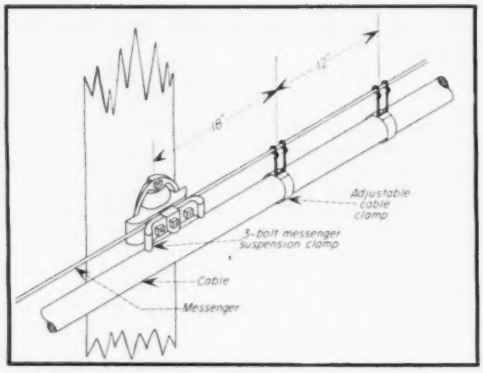
402-109

Supports for Aerial Cable Messengers

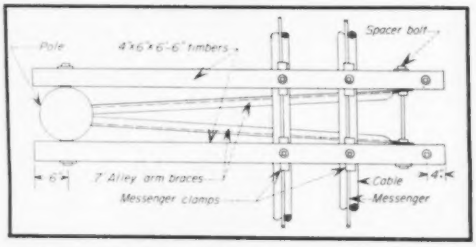
A guide to support aerial cable messengers at various types of construction; an adaptation from standards of United Illuminating Co., New Haven, Conn.



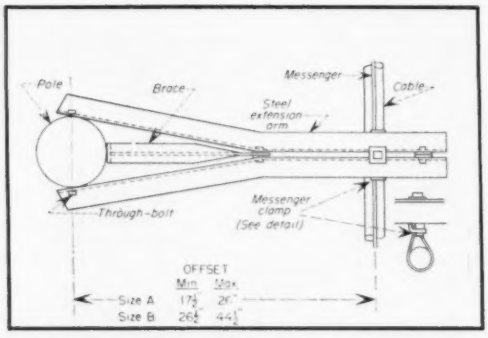
MESSENGER PULLOFF is used for a slight corner in the line where a pole cannot be placed at the corner location or where the messenger must be pulled off line to avoid some obstruction



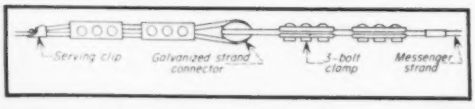
SUSPENSION CLAMP supports messenger run at a tangent or corner under 5 ft pull



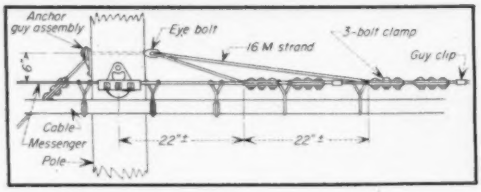
WOOD EXTENSION ARM carries messenger and cable



MESSENGER carried by steel extension arm. Clamp lip should be normally toward pole and facing up. If there is an uplift on messenger at this point, clamp should be reversed so lip is down

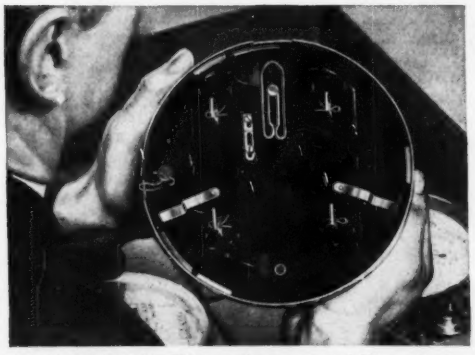


MESSENGER SPLICE uses galvanized strand connector



FALSE DEAD END for messenger

CERTIFICATION MEANS that average accuracy (bar X) of the meters, when they leave the factory, is within ±0.1%, and dispersion about that average (sigma) is within 0.15% at full load, 0.20% at light load. They are also 99.9% free from defects that might cause improper registration or operation.



ONLY WATTHOUR METERS basically accurate as I-50's can be factory certified within these limits. Note the gold seal of certification which is attached to every General Electric certified I-50 watthour meter.

EACH I-50 WATTHOUR METER is checked for full, lag, and light load on one of twenty final test panels. Calibration before and after 6000-mile shipping tests showed meter accuracy was only slightly affected.

CAN METER TESTING COSTS BE REDUCED?

Certification of I-50 watthour meters points to better utilization of manpower

Let's consider for a moment what factory-certified meters can mean to the electric utility industry.

In the first place, I-50 meters are so designed and manufactured that they leave the factory with an unusually high degree of accuracy and performance. Acceptance tests made by utilities on thousands of I-50 meters indicate that factory accuracy and performance are sustained.

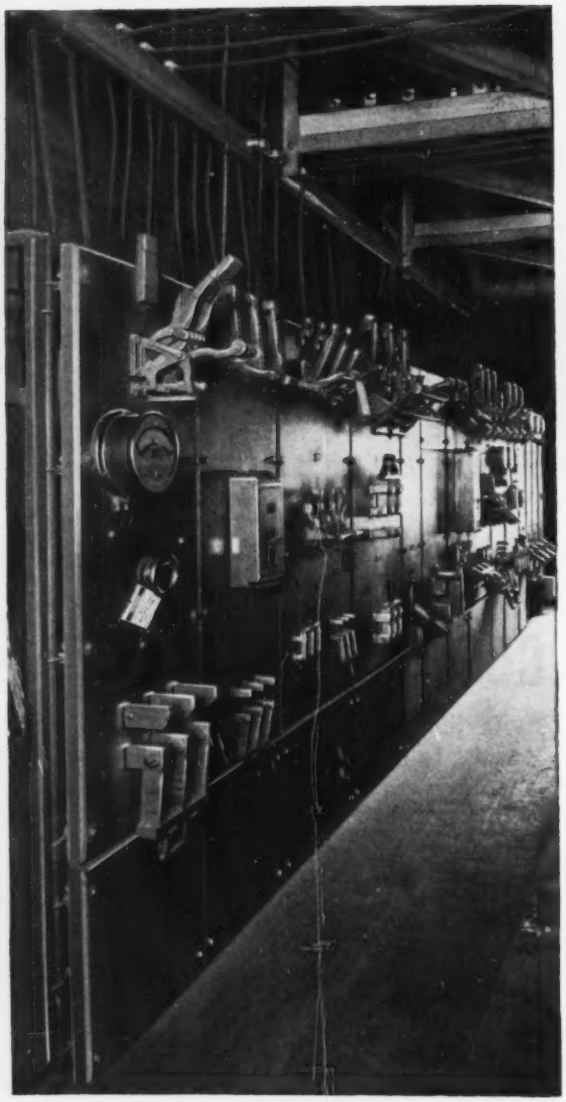
This means that, as far as the meter itself is concerned, acceptance tests could be eliminated. Furthermore, the inherent long-term stability of I-50 accuracy and performance suggests the extension of periodic test intervals.

Because technically trained men are so important to the operation of any electric utility system, it seems to us that the significance of certified meters might well be interpreted in terms of reduced operating costs and better use of technical manpower. For more information, call your G-E representative or write for bulletin GED-1408, Sec. 601–77, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

601-77

Power bottleneck broken



This is the old open-type switchgear originally installed at the Traylor Engineering & Manufacturing Co. Exposed switches were a safety hazard. With extra feeders added through the years to take care of expansion, the rear of the switchboard had become a tangle of cables, inviting short circuits. Old 240-volt distribution system seriously limited future expansion.

New G-E Metal-Clad switchgear provides for increased output, gives greater safety

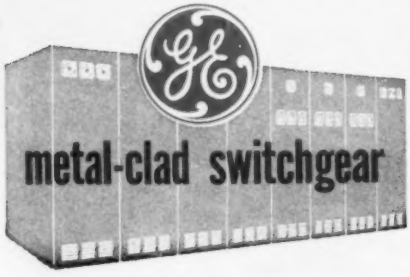
Old equipment was inadequate for growing needs

After years of service at the Traylor Engineering & Manufacturing Co., Allentown, Pa., the old-fashioned switchgear shown at left was operating on borrowed time. Already over-loaded through increasing power demands, it had become a bottleneck that limited expansion and hampered efficient production.

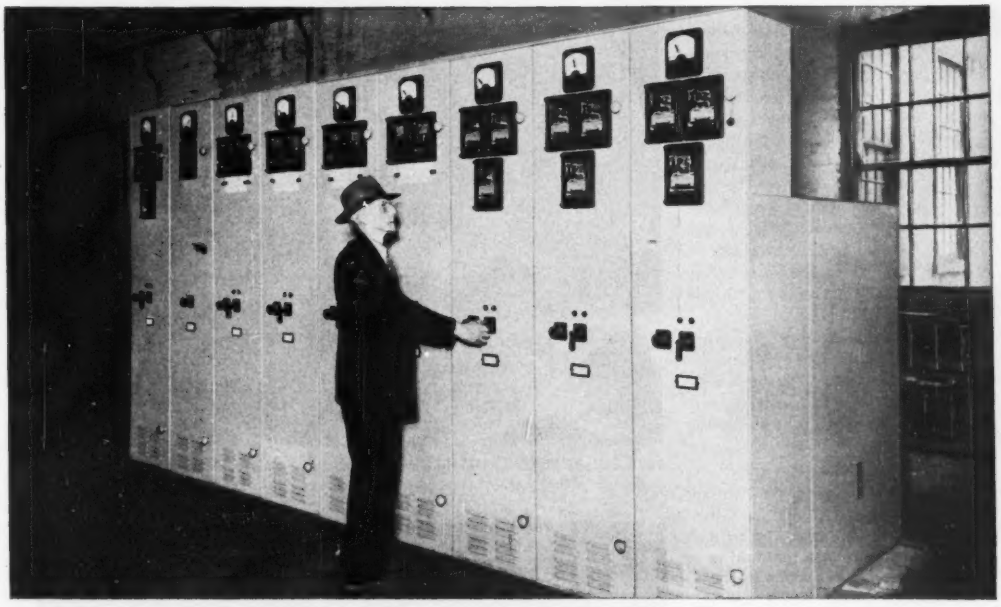
With interrupting devices entirely inadequate to handle the power that could be delivered under short-circuit conditions, any major fault in the system could have been disastrous.

Today this obsolete equipment has been replaced by modern G-E metal-clad switchgear. Dangerous exposed switches have vanished. Interrupting capacity is adequate to take care of abnormal conditions. And a modern high-voltage distribution system assures ample power for years to come. See opposite page.

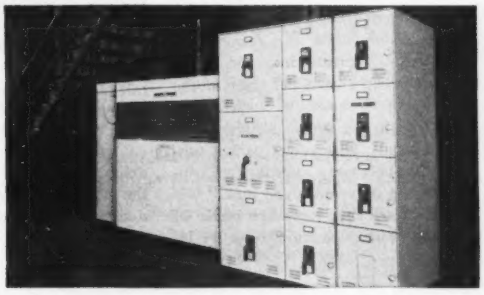
For information on similar equipment for your plant, contact your G-E sales representative—or write for Bulletins GEA-3083 Metal-clad Switchgear; GEA-3592 Load-center Unit Substations; GEA-3758 Load-center Power Distribution. ***General Electric Company, Schenectady 5, N. Y.***



at this Eastern Plant



Modern G-E Metal-clad Switchgear now installed at the Traylor Company provides greater safety because all parts are completely enclosed. For greater protection against short circuits, separate circuits are isolated in individual compartments. Circuit breakers may be easily removed for inspection, with protection for personnel. Power is distributed from this unit at 2400 volts, replacing the old 240-volt distribution system.



Load-center Unit Substation eliminates long low-voltage feeders—saves copper. 2400-volt power is received at this load-center unit substation and stepped down to utilization voltage on the factory floor. Because the substation is located close to the machines it serves, low-voltage feeders are short, saving copper and giving better voltage control. Discarded cable previously used for low-voltage distribution is shown at left.

GENERAL ELECTRIC

"Umbrella-Device" Retrieves Tools From Pipes

OWEN C. SWIHART
Results Tester, Twin Branch Plant
Indiana & Michigan Electric Co
Mishawaka, Indiana

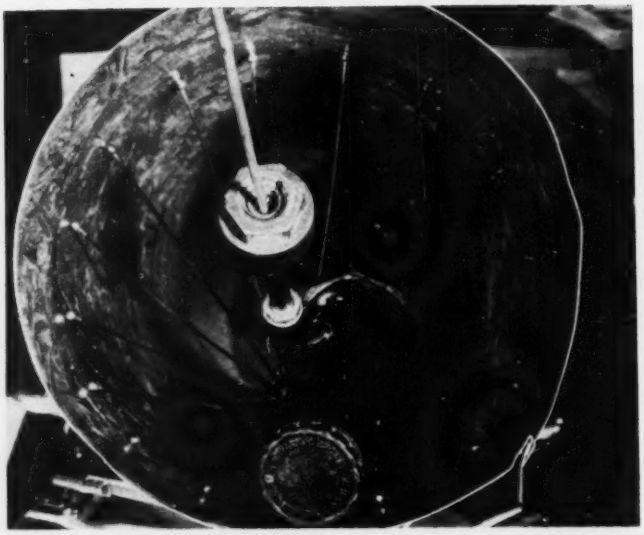
Quick removal of tools and other objects from large pipes is possible with an "umbrella device" or retriever. It eliminates the need for cutting into the pipe and the subsequent repair.

The retriever, in closed position, is pushed into the pipe by means of a suitable probe wire to a point beyond the foreign object. A sharp jerk of the probe wire releases the springs allowing them to open like the ribs of an umbrella. Then the retriever is pulled out of the pipe, bringing the object with it.

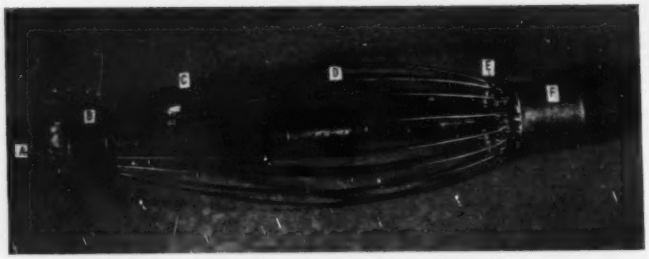
First application was the retrieving of a hammer which dropped into an 8-in. condensate inlet to a high-pressure heater. Dropping vertically 10 ft, the hammer followed the horizontal run for about 20 ft. Two men spent more than a day trying to remove the hammer with hooks, magnets, etc, but with no success. Although the first retrieving tool (described here) was crude, the hammer was removed in a matter of minutes.

The model shown, which was designed for 4 to 12-in. diam pipes, has 16 spring wires 9 in. long radiating at 45 deg backward from the longitudinal axis. For smooth retraction the spring wires terminate in 3/16-in. diam steel balls which also hold the wires in the sliding collar when the retriever is cocked for insertion into the pipes. To reduce the closed diameter of the tool, a coil is made in each spring wire close to the inertia weight forming the point. This weight, which supplies the necessary inertia for tripping, is the only machined part.

Later retrieving tools are made of standard ⅛-in. pipe and fittings, ¼-in. machine bolt, and a set screw to hold the probe wire. A 1¼ x ⅛-in. reducing bushing was retapped backward to form the trigger collar. The wires were fastened in holes in the weighted point with silver solder, care being taken not to remove the temper of the wire.



RETRIEVING FLASHLIGHT is simple task with retriever. Wire ribs hold object as device is pulled out. Steel balls prevent ribs from jamming on ridges in pipe



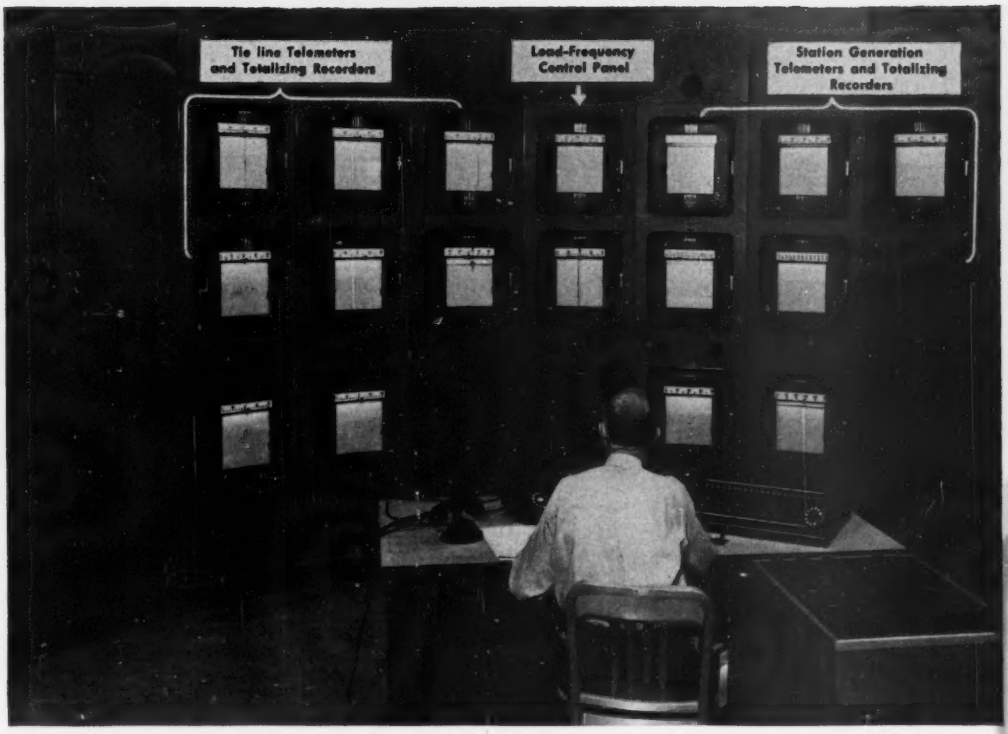
TOOL RETRIEVER without probe wire attached. Probe wire shown above is threaded through hole (A) in sliding collar (B) and clamped with set screw (C). Sliding collar holds ball-ends of ribs (D) until released by coiled springs (E) attached to inertia point (F). A sharp pull causes ribs to open like an umbrella

Timer Checks Demand Meter Printing Period

Testing duration of printing-reset period of Boston Edison's printing-type demand meters is facilitated by a contact indicating device. Correct printing interval is important to assure a record that is neither faint nor blurred.

C. H. AMUNDSEN
Meter Division
Boston Edison Co

Essentially, the device consists of a Telechron synchronous motor whose terminal shaft makes one revolution per second, with a shaft extension carrying an aluminum watt-hour meter disk cut down to a diameter of 2.5 in. A sector of the disk is marked in a V-shaped radial area which indicates at its boundaries the maximum and minimum time required for the disk to turn to a per-


Tie line Telemeters and Totalizing Recorders
Load-Frequency Control Panel
Station Generation Telemeters and Totalizing Recorders

System operator's office for a 700,000-kw southern utility has Speedomax Impulse telemeters for each of five tie lines and for each major steam plant. Telemetering receivers also retransmit their readings to Speedomax totalizing instruments on the same panel.

Load Facts are just an "Eye's Length" Away with Speedomax Impulse Telemeters

The job of scheduling and distributing power goes more smoothly and more efficiently, when facts on tie line and station loads are brought to a central point and automatically recorded where the system operator can watch them. Many of the country's major utilities have selected Speedomax Impulse telemeters to do their data-gathering —for these reasons:

Speed: The Speedomax receiver in the dispatcher's office starts to show load changes within two seconds from the instant they occur at the metering point.

Accuracy: Load measurement at both ends of the channel is by the potentiometer method, long recognized as the standard of precision. Readings are reproduced so accurately that charts from transmitter and receiver cannot be distinguished from each other.

No Synchronizing Problems: Speedomax receiving instrument automatically keeps in step with the transmitter, without auxiliary synchronization. Transmitter and receiver can operate from power sources of different frequencies.

Detailed Record: Each detail of load variations is easily read on Speedomax 9⅞-inch wide chart.

Long Distance: This equipment operates with telephone circuits, carrier or microwave channel, and works over any distance within the capabilities of the channel.

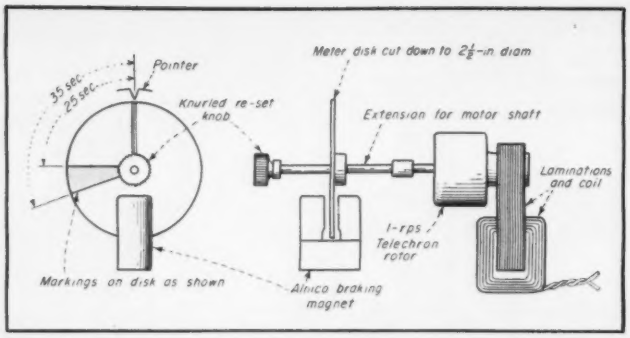
Integral Checking: Accessories built into the transmitting and receiving recorders permit checking and calibrating the channel without meter tests.

Automatic Control: Speedomax Telemeters can be equipped with various control devices and incorporated directly into existing L&N load-frequency control.

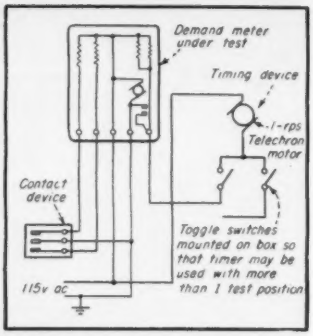
For details, write to Leeds & Northrup Company, 4938 Stenton Avenue, Philadelphia 44, Pa.

Jrl Ad ND46-58-461(2)

LEEDS NORTHRUP



TIMING UNIT insures a printing interval between 0.25 and 0.35 sec so demand meter will print clearly. Equipment is enclosed in a small box with re-set knob projecting through circular window. Reference point is painted on glass window


Demand meter under test
Timing device
1-rps Telechron motor
Contact device
Toggle switches mounted on box so that timer may be used with more than 1 test position
115v ac

DEMAND METER and timing device connections. Timer rotates when printing and re-set coils are energized

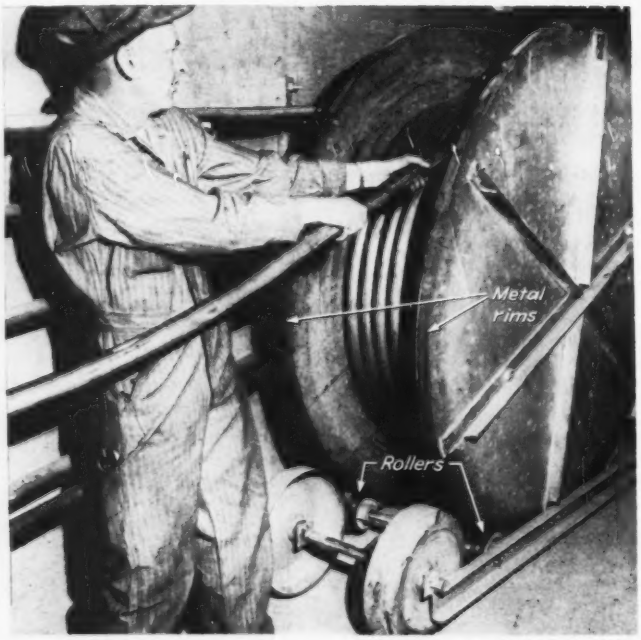
manent reference point on a glass cover above the disk.

When the interval timer contacts of the demand meter close to energize its printing and re-set coils, the timer motor starts to rotate. As soon as the interval-timer contacts open (at the conclusion of the printing operation), the timer motor stops.

Position of the disk marking, relative to the reference point on the glass cover, shows whether or not the duration of the printing period has fallen within the proper range of time—from 0.25 to 0.35 sec. If the printing period has been too short, the disk V-marking will stop at the left of the pointer painted on the glass cover. If too long, the marking will stop at the right of the pointer. The demand meter is considered satisfactory if the shaded area between the maximum and minimum limits falls opposite the pointer indication on the cover of the timer.

The disk turns between the poles of a braking magnet which overcomes any tendency to over-shoot. A knurled re-set knob at the end of the shaft extension turns back the disk for another test. Two toggle switches mounted on the timer box allow the timer to be used at two test positions.

Free-Wheeling Reel Protects Lead-Covered Cable

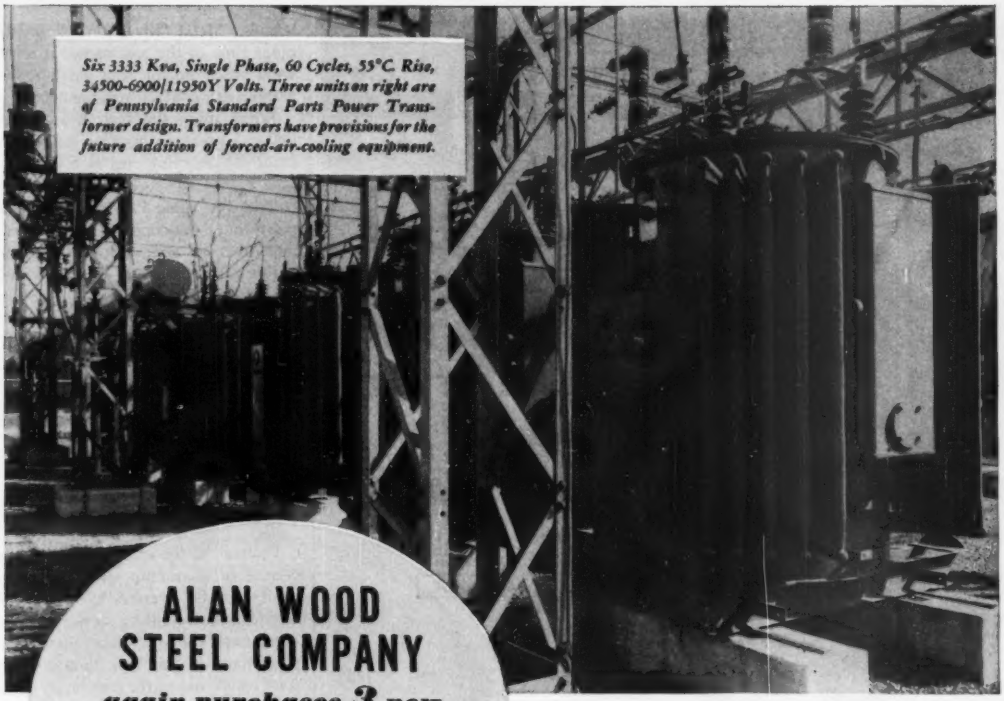


F. H. WILEY
Electrical Superintendent
Colorado Springs Dept of Public Utilities

To place lead-covered cable on racks in a power plant tunnel without scraping it on the floor, Colorado Springs Dept of Public Utilities uses a specially designed carriage and cable reel. Height and width of the tunnel, plus minimum allowable bend in the largest cable concerned determined the dimensions of the reel, which was built in the shops of the Department. It is large enough to take the maximum amount of cable needed for one run, and handles paper-insulated, lead-covered cable up to 400-Mcm, 3/C, 15 kv.

The reel rests on four small rollers, connected in pairs on two shafts. The roller shafts are mounted in a carriage which is supported by four large

FREE-WHEELING CARRIAGE with special reel for placing large cable in tunnels without damage from scraping. Two pairs of rollers support reel, so cable can be unwound independent of movement of the large carriage



Six 3333 Kva, Single Phase, 60 Cycles, 55°C. Rise, 34500-6900/11950Y Volts. Three units on right are of Pennsylvania Standard Parts Power Transformer design. Transformers have provisions for the future addition of forced-air-cooling equipment.

ALAN WOOD STEEL COMPANY

again purchases 3 new PENNSYLVANIA STANDARD PARTS POWER TRANSFORMERS

Pennsylvania TRANSFORMERS

RECENTLY, three new Pennsylvania Power Transformers, with a total rating of 10,000 Kva, were put into service alongside three older Pennsylvania Transformers with a similar rating. Though both banks of transformers have the same electrical characteristics, there is a decided difference between the old and the new group of transformers. The new units are Pennsylvania Standard Parts Power Transformers, which have certain distinct advantages for the user:

1. Definite savings are effected by the purchase of Pennsylvania Standard Parts Power Transformers. These savings are made possible by the use of standard designs, standard parts, and standard methods of manufacturing, which shorten engineering and production time.

2. The purchaser is able to select the method of oil preservation that he prefers without any price penalty. The transformers illustrated above are equipped with an inert gas, oil pressure system.

3. The transformers feature the many new design improvements built into Pennsylvania Standard Parts Power Transformers. Included are:

   A. a new improved structural steel base which simplifies the important problems of jacking, pulling, rolling and painting;

   B. a new streamlined radiator designed to facilitate cleaning and painting in the field.

For more complete information on Pennsylvania Standard Parts Power Transformers, write to Pennsylvania Transformer Co., Box 330, Canonsburg, Pa.

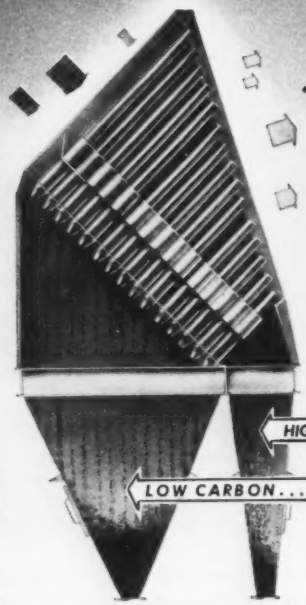
What are Pennsylvania Standard Parts Power Transformers?

They are single phase transformers in sizes up to 5000 Kva, 69 Kv, and three phase transformers in sizes up to 10,000 Kva, 69 Kv. Transformers are "Standard" when they conform to standard voltage ratings, have standard taps and standard impedances, and are equipped with standard accessories in standard locations. For such transformers a full discount is applied. When voltages are not standard, but within a certain voltage range, slightly lower discounts are applied.

Pennsylvania TRANSFORMER COMPANY

CANONSBURG, PA. • *Greater Pittsburgh District*

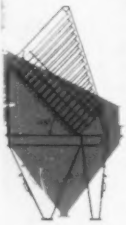
REFIRE HIGH CARBON DUST *without* recirculating fly-ash



. . . *install* P-D

TUBULAR DUST COLLECTORS *arranged for* DECANTATION

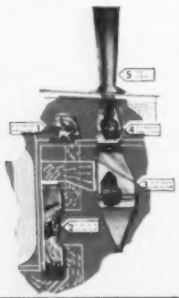
In a single phase P-D tubular collector, designed for decantation and *requiring no additional pressure drop*, it is now possible to separate the large particles of high carbon content from the non-combustible finer particles.



Fly-ash from spreader stoker-fired units, consisting of up to 40% high carbon particles, can effect considerable savings when re-injected. It is necessary to effect separation, however, since the non-combustible smaller particles remaining in the system increase in concentration, causing erosion and possible poor combustion due to spotting.

Space requirements for the decantation design are not as great in area and only slightly higher than a standard tubular . . . and, collection efficiency is high. Superimposed sketch shows comparative size.

Why waste fuel? Investigate this collector today, it will soon pay for itself. Write our Sales and Project Engineers for Bulletin 260 D.



UNIT RESPONSIBILITY

Prat-Daniel, through its sales and project engineers, The Thermix Corp., offer a complete complement for handling the air gas stream: Forced Draft Fans, Air Pre-heaters, Tubular Dust Collectors, Induced Draft Fans and Fan Stacks. This unit responsibility, by a well known firm, relieves the engineer of the responsibility for one of the most important functions in a steam generating plant.

Sales and Project Engineers

THE THERMIX CORPORATION

GREENWICH, CONN.

Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St. W., Montreal 25, Quebec
50 Abell St., Toronto 3, Ontario

Designers and Manufacturers

PRAT-DANIEL CORPORATION

SOUTH NORWALK, CONN.

wheels. Metal "tires" shrunk on the outer rims of the reel permit it to revolve easily on the four small rollers without any contact with the floor.

When using the reel, it is placed under a manhole opening, and cable from the shipping reel is transferred onto it. The carriage is wheeled to the end of the cable run and the cable put through the conduit to its approximate final position. After it is secured in this position three or four men push the carriage, and two men turn the reel and place the cable on the racks as it unwinds.

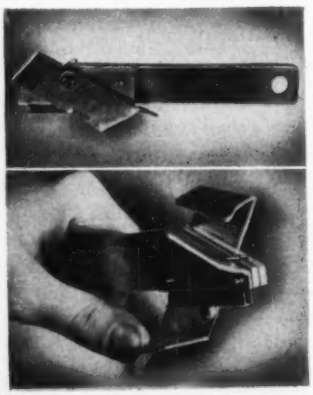
Simple Sheath-Splitter Safe for Aluminum Cable

C. L. LUCAL
Asst Supt of Meters and Services
The Ohio Power Co.
Canton, Ohio

Damage to the small strands of the neutral of aluminum service-entrance cable can be averted by using the simple sheath-splitting device shown. Aluminum cable is more susceptible to damage of this type than copper. As a result, use of the customary skinning knife is generally unsatisfactory.

The Ohio Power Co has substituted, in full or part, aluminum for copper conductors in service-entrance cable. This consists of two insulated conductors spirally wrapped as a group with a bare neutral, two overall rubber-filled tapes, and a braid covering which forms an oval cable.

The inexpensive device illustrated securely holds two razor blades so that one corner of each blade protrudes as



SHEATH-SPLITTER has two razor blades held in place by two screws. Pivoted clamp (shown open) is held closed by concealed torsion spring

Look closely at the jumpers on this strain tower... No splices! Conductor cable runs straight through without resorting to parallel jaw clamps to carry current and, eventually, to make trouble.

Construction like this is possible with O-B Hi-Lite strain clamps. It's easy to build, easy to inspect for soundness at any time, easy to keep in top condition. No special equipment, tools, or skills are required to install O-B Hi-Lites. A minute or two with a standard wrench and they're ready to serve the life of the line. Basically low in first cost, the O-B Hi-Lite installs at an attractive over-all saving.

Just add up these factors: Design that permits the use of continuous jumpers--convenience--high maintained holding power--positive inspection for soundness at any time--low installed cost--availability in either ferrous or non-magnetic, non-heating alloys. Don't you agree it's worth your time to investigate O-B Hi-Lite strain clamps?

Ohio Brass

MANSFIELD - OHIO

4150-38

PECO BATTERY CHARGERS and POWER SUPPLIES . . .

. . . are *Packaged* UNITS

- All components in one cabinet
- No special foundations necessary
- Internal power and control wiring factory installed
- Saves valuable floor space

STARTING contactor, voltage and current controls, transformer, filter components, rectifiers, meters and protective devices — all components necessary for rectifier operation and control are contained in the heavy sheet metal cabinet of the PECO Packaged Equipment . . . Compact design eliminates the necessity of installing separate starter and control panel and the interconnection of power and control circuits . . . AC input and DC output leads may be brought in from the top, simplifying conduit installation . . . There are no moving parts . . . No fans or other ventilating equipment required . . . No special foundations necessary.

POWER EQUIPMENT *Company*

Battery Chargers ☆ Battery Eliminators ☆ D.C. Power Supply Units ☆ Regulated Exciters ☆ and other Special Communications Equipment

55 ANTOINETTE STREET / DETROIT 2, MICHIGAN

a cutting edge. The pivoted clamp holds the cable against the cutting edge while stripping, and guards both cutting edges when the device is not in use.

Cutting corner of one blade protrudes 1/16 in., which is the depth of cut required to completely split the over-all braid. However, the blade does not cut the spirally wrapped layer of rubber-filled tape adjacent to the neutral strands. Consequently, the rubber-filled tapes can be unwound, leaving the strands free of damage.

The cutting corner nearer the closed side of the pivoted clamp protrudes only 3/64 in. for splitting the neoprene or polyethylene jacket on No. 4 stranded-aluminum service-drop wire.

This device was manufactured for The Ohio Power Company by Superior Switchboard and Devices Co. Other commercial cutters are being tried to determine if they can be effectively adapted to this purpose.

Potential Lead Tester Cuts Inspection Time

W. H. BLAIR
Meter Laboratory
Potomac Electric Power Co
Washington, D. C.

A device for testing rotating standard potential leads puts a big cut in inspection time for about 50 sets of leads each week. It eliminates the possibility of sending out a tested standard which has defective potential leads and weeds out those leads which are on the threshold of failure.

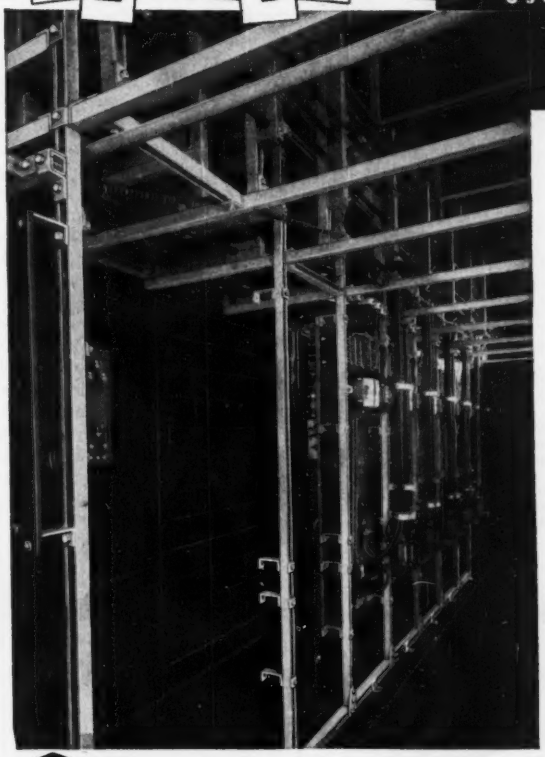
We have used this tester successfully for 15 years, mainly to assist in locat-

ONE MINUTE is all the time it takes an experienced man to check one of the 50 sets of leads tested weekly

FLEXIBLE UNISTRUT

used in AMERICAN SUGAR REFINING COMPANY PLANT

All Cable, Switchboards and Timer Control Panels Supported by Completely Adjustable Unistrut Framework

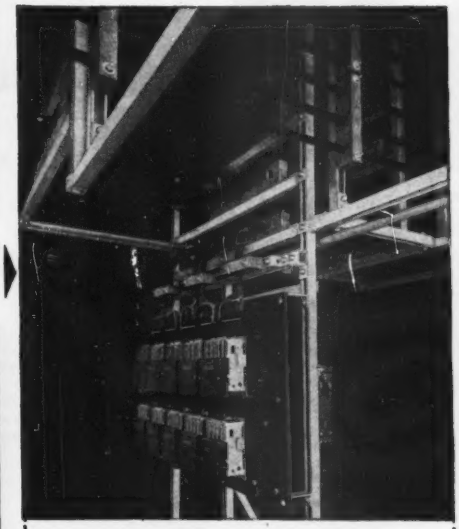


Note effective use of easily positioned maple cable clamps mounted on Unistrut channel.

Installation is equipped throughout with Unistrut for the support of all motor control apparatus and cable.

These pictures show how Unistrut channel and fittings, with maple and porcelain insulators, combine to support all control equipment for the motors that operate centrifuges in one step of the sugar refining process at the Chalmette, Louisiana plant of the American Sugar Refining Company.

Unistrut permitted fast, on-the-job framing assembly where all adjustments were quickly made by merely loosening a bolt, and where supporting members were added as the work progressed. Because no drilling, welding, special tools or equipment are required to assemble Unistrut, engineering detailing and construction time were kept to a minimum. Another advantage lies in Unistrut's built-in flexibility which makes possible later changes and additions to the existing structure.



With Unistrut you can build all types of framing, mounts, shelving, racks, tables and benches—conduit, cable, pipe and tubing hangers and supports, fluorescent fixture supports, and many other structures with just a hacksaw and a wrench. Give Unistrut a trial in your business.

Representatives and Warehouse Stocks in Principal Cities
Consult your Telephone Directories

U. S. Patent Numbers
2327587 2363382
2329815 2380379
2345650 2405631
Other patents pending

UNISTRUT

The World's Most Flexible All-Purpose Metal Framing

UNISTRUT PRODUCTS COMPANY
1013 WEST WASHINGTON BLVD. • CHICAGO 7, ILLINOIS

FREE CATALOG and WALL CHART!

Write for your copy of 24-page Construction Catalog No. 500, 24 x 36 Wall Chart and sample of Unistrut.

UNISTRUT PRODUCTS COMPANY

1013 W. Washington Blvd., Chicago 7, Ill., Dept. W 6
Please send me, without obligation, the items checked below:

☐ Catalog No. 500 ☐ Wall Chart ☐ Unistrut Sample

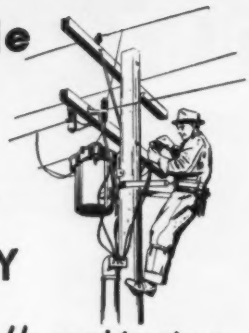
Name_____

Company_____

Address_____

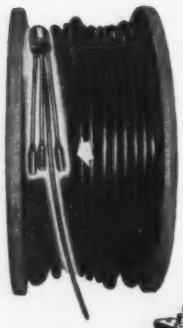
City_____ Zone_____ State_____

By-pass Trouble



EFFECTIVELY
EFFICIENTLY
and EASILY

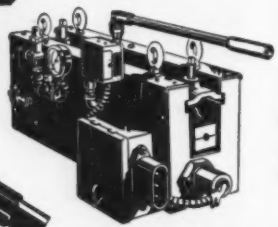
with JOY *Connector-Cable* combinations

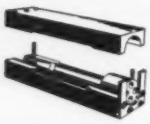


When nature or man-made catastrophies disrupt vital power and communication lines, time required to restore normal operations becomes extremely important. One of the most effective ways to minimize this *down-time* is to "Jumper" broken circuits with pre-fabricated JOY Cable-Connector combinations, until permanent repairs can be completed.

Shatter-proof, water-tight and amazingly resistant to wear JOY plugs, sockets and receptacles are available in a variety of sizes and designs that cover standard mechanical and electrical requirements. Factory molded as one-piece molded Neoprene units on 12" to 36" cable leads these plugs are shatter-proof, water-tight and wear-resistant. No special training is required to attach them to cable, and through use of JOY Vulcanizers and Molds even the insulation around the splice becomes an integral part of the cable jacket . . . See cable reel illustration at left.

ABOVE: Cable bushing and end block





CONNECTORS
Water-tight, shatter-proof and jerk-resistant. Available in a wide variety of sizes and styles for standard communication or power transmission needs. Factory molded as integral Neoprene units many are equipped with the famous JOY Water Seal. For complete specifications describe your needs or ask for Bulletin MC-108.

VULCANIZERS
Simple to operate. Can be used for patching cable, rejacketing splices or attaching JOY Connectors. When simple directions *included with each Vulcanizer*, are followed, completed splices are water-tight and wear-resistant. Two designs are available. 1—Steam heated 2—Directly heated . . . Both operate electrically. Bulletin RV-106 describes them in detail. Ask for your free copy now.

MOLDS AND SUPPLIES
Accurately machined in two identical half sections. Hundreds of sizes and many dimensionally correct styles have been developed to cover splicing, patching and pot-heading needs. For detailed information on them as well as JOY vulcanizing Tapes, Cements, and other supplies ask for Bulletin RV-106.

No question about it . . . JOY Connectors attached to rubber or Neoprene jacketed cable with splices insulated and jacketed through the use of JOY Vulcanizers make today's most dependable, electric jumpers. Completely portable and safe they will function perfectly on job after job with a minimum of maintenance attention.

Consult a Joy Engineer

100 Years of Engineering Leadership

M.E. 351.3

JOY MANUFACTURING COMPANY

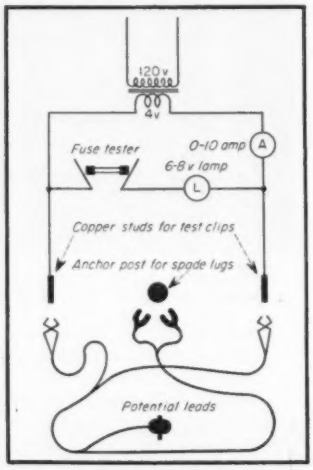
HENRY W. OLIVER BUILDING, PITTSBURGH 22, PENNSYLVANIA

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LTD., GALT, ONTARIO

ing points of poor contacts in the leads. The usual sources of trouble are broken strands of wire along the lead or at the spade lugs and test clips, loose terminal screws on the switch and test clips, and defective contacts in the switch.

A potential of about 4 v is obtained from the 120 v service through a small 50-va step-down transformer. This low-voltage source, a 0-10 amp ammeter, and a set of potential leads form a simple series circuit. The regulation of the transformer plus resistance of the circuit and a set of normal potential leads will limit the current in our tester to about 10 amp. Should the potential leads be failing, the ammeter will respond accordingly.

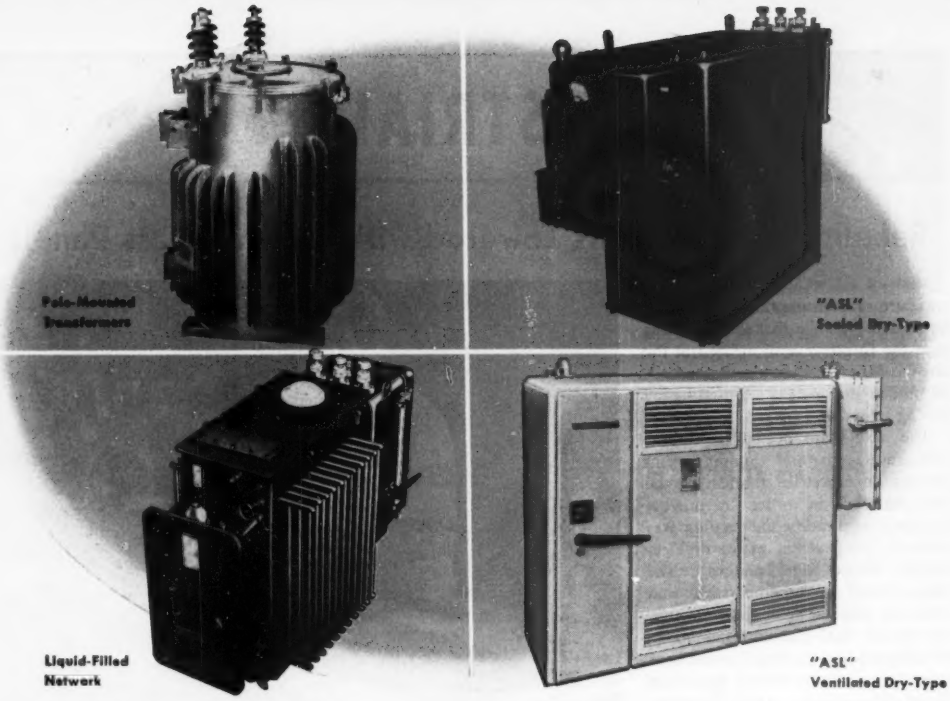
When testing a normal set of potential leads the current will be relatively high, ammeter pointer will remain fairly steady when the leads are flexed or pulled, and ammeter indications will be approximately the same each time the pendant switch on the leads is snapped off and on. About one minute is required for an experienced man to inspect and test a pair of leads.



TESTER is used mainly for locating points of poor contact in rotating standard potential leads. Fuse testing circuit increases the utility of the tester

The lead tester is comparable to a small rotating standard in size and weight. Most expensive components used in its construction were the transformer and ammeter.

The tester's utility is increased by including a fuse-testing circuit, as shown in the schematic diagram, and two compartments to hold a supply of 2- and 12-amp standard fuses.



Standardized Transformers make networks pay... FASTER!

Sure, network systems pay. The big savings come from continuity of service, flexibility to meet changing demand. But there's another important saving available right now. That's the saving you can realize in transformer costs. Standardization brings production economies that are passed directly to you.

These four-standard transformers meet every network requirement:

FOR GENERAL USE. Liquid-Filled Transformers, the workhorse of the network system. Available in sizes 1000 kva and below, 34,500 volts and below, oil or Inerteen® filled.

FOR INDOOR SERVICE. Dry-Type Transformers, ideal for indoor networks . . . lightweight, economical and maintenance-free. Available in sizes 1000 kva and below, 15,000 volts and below.

FOR GREATEST SAFETY. Sealed Dry-Type Transformers give greater safety for crowded areas, or where hazards like explosive gas atmospheres, corrosion or water conditions are not suitable for ventilated dry-type. 1000 kva and below, 15,000 volts and below.

TOPS FOR ECONOMY. Pole-Mounted Transformers for overhead networks. Available in a wide range of sizes, from 150 kva and smaller 15,000 volts and below.

Let us talk them over with you and point out the specific economies that can fit into your plans best. In addition, our complete facilities . . . engineers and calculating boards . . . are available to help you make future expansion more economical. Ask your Westinghouse representative, or write for booklets B-4028 and B-4002A. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-70587

YOU CAN BE SURE... IF IT'S

Westinghouse

NETWORK TRANSFORMERS

Bakelite Heating Costs Lowered with Radiant Glass Panels

Radiant Glass heating panels have cut current consumption for heating laminated phenolic (bakelite) sheeting over the formerly used method at the Sheffco Mfg Co, Palisades Park, N. J. Seventeen glass panels are used—each having a load of 1,000 w.

The sheets are heated to various temperatures before stamping, embossing or otherwise fabricating the raw material, in order to prevent fracture.. Formerly the heating was done by using steam plates or electrically heated steel platens. The steam plates were cumbersome and were not mobile. While the electrically heated steel platens were mobile even though heavy—their current consumption was three to four times that of the glass panels. After two years operation, the panels have withstood factory usage without deterioration or breakage, according to L. G. Thomas, Sheffco's president.

Continental Radiant Glass Heating Corp photo

RADIANT GLASS heating panels cut consumption to one-third that of formerly used method of heating bakelite sheeting. Panels withstand factory usage without deterioration or breakage over long period

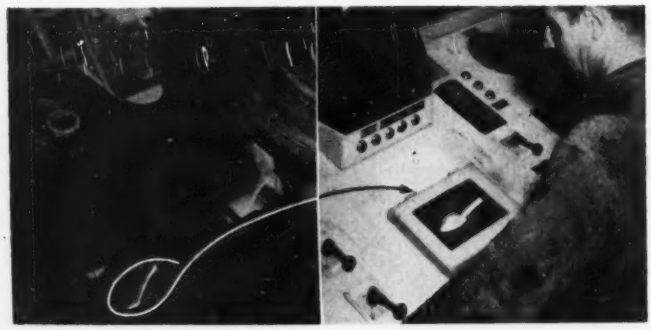
TV Cuts Steel Making Manpower

Wired television saves manpower and promotes safety and control quality in the continuous casting of steel billets at the Babcock & Wilcox Tube Co, Beaver Falls, Pa.

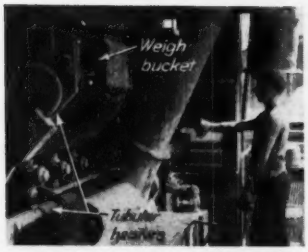
The pouring operation is very critical. To get good sound billets, without spongy spots or air inclusion, the mold must always be kept full to a certain exact level. Formerly, it was necessary to station a man directly at the mold top to watch the pouring, ready to signal the operator 50 ft away. There was always the possibility of a misunderstanding, the hazard was very high, and the discomfort from radiant heat quickly became unbearable.

Now, the wired television camera with long focus lens is suspended above the molten metal surface in the mold. It transmits an exact, instantaneous, and continuous picture of the molten metal level to the viewing screen which is placed in the control panel. Here the operator watches pouring at close range, and in safety and comfort.

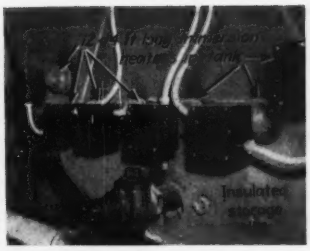
Known as the "Utiliscope," it is a simple, effective, and inexpensive television system that transmits by wire instead of by broadcast. It is built by Diamond Power Specialty Corporation, Lancaster, Ohio.



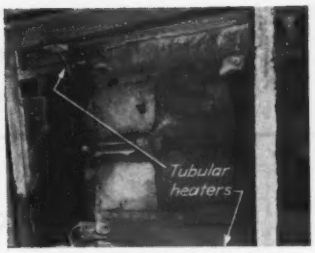
WIRED TV watches pouring of molten metal and enables one operator 50 ft away to closely control this critical pouring operation, increases safety, lowers costs, and improves quality. TV camera at top of left picture is focused on molten metal as it pours into mold. Camera and viewing screen are connected by coaxial cable



WEIGH BUCKET in which asphalt is measured is heated by 6 kw of tubular heaters. All heaters are arranged for low cost off-peak operation to maximum extent possible



IMMERSION HEATERS (twelve) 14 ft long maintain a uniform heat pattern at bottom of each storage tank. Heaters are thermostatically controlled and have seven selections of timing and input



Edwin L. Wiegand Co photo

MIXER GATES are kept from "freezing" by tubular heaters. Seven position selector switch provides flexible timing and input for off-peak operating economy

Electric Asphalt Heating Eliminates A Steam Plant

Installation of electric asphalt heating at the Burrell Construction Company's asphalt plant at New Kensington, Pa., replaced a worn-out steam heating system and eliminated the need for boiler firing and maintenance. Closely regulated temperature control and elimination of moisture produces a better quality asphalt. By off-peak operation of the electric heaters, the heating cost per ton is kept low.

Asphalt is heated electrically in one 10,000-gal and two 15,000-gal storage tanks. Each tank has 12-14 ft thermostatically controlled immersion heaters to maintain a uniform heat pattern at the bottom. Tank heaters total 252 kw and are automatically controlled to melt the material with high heat during off-peak hours and hold it at low heat or "off" during peak periods.

A wye-delta arrangement is used in wiring the heaters. The delta arrangement is used for heating and melting and the wye for holding. A special 7-position selector switch is used for selections of timing and input. A relatively small amount of power is required to maintain temperatures at 300 F in the well-insulated storage tanks.

Heat is also maintained electrically in the transfer pipes, weigh bucket, and mixer. A total of 10 kw in tubular heaters are mounted flush against the transfer pipes which are provided with insulated wrapping. The weigh bucket which measures the asphalt is heated by 6 kw in tubular heaters. Tubular heaters keep the mixer gates from "freezing." Asphalt passing through the pump is kept warm by a thermostatically controlled convection heater. Total heating load at this installation is 275 kw. The plant management is well pleased with the low heating cost per ton.

INDUSTRIAL BRIEFS

Thickness Gaging with Beta Ray Gages measures materials beyond the scope of conventional instruments. Moving sheets in process are checked without contact—whether of paper, textiles, rubber, plastics, or metals. Soft or tacky materials are not marred. Continuous monitoring of the product improves quality, cuts scrap losses, conserves raw material, and gives better control of processes. Gaging is by a beam of Beta rays which passes through the sheet without friction. This reduces losses from off-gage and overweight sheets of varied composition. General Electric Co.

Marking Identification of invisible ink is made possible by a fluorescent F15T8/BL tube (with a purple filter) at the New Way Laundry, Savannah, Ga. This 15 w black light fluorescent tube will fit in any standard 15 w fluorescent lamp fixture and requires no special starter or ballast. C. D. Anderson, power sales engineer, Savannah Electric and Power Co.

Flashovers and Burndowns of ordinary overhead wires caused by insulators and wooden structures becoming conducting due to dust, moisture, and acid fog in atmosphere surrounding the Rumford, Me., mill of Oxford Paper Co, have been eliminated by substituting self-supporting aerial cable for the open wires. According to company officials the combination of high voltage moisture and heat resisting insulation, protected by non-conducting weather- and chemical-resistant sheathing solved this serious problem. The Okonite Co.

Electric Steam Jet cleans machines quickly and efficiently without interrupting work in adjacent areas at Worcester (Mass.) Pressed Steel Co.

Steel Structure Electric Welding saved the Steel Construction Co approximately 10% in operating costs on three modern buildings in Birmingham, Ala.—the 13-story annex of Alabama Power Co, the 6-story Dental Clinic at the Medical Center, and the 14-story Highland Tower apartments. Utility service was used to drive the m-g welders used on each building. Savings of time, material, and manpower were realized. The quiet operation of these electric welders was extremely important — especially on the Dental Clinic job since it is adjacent to two large hospitals. Virgil Rice, Industrial Power Engineer, Birmingham Electric Co.

SALES AND SERVICE

RESIDENTIAL • RURAL COMMERCIAL

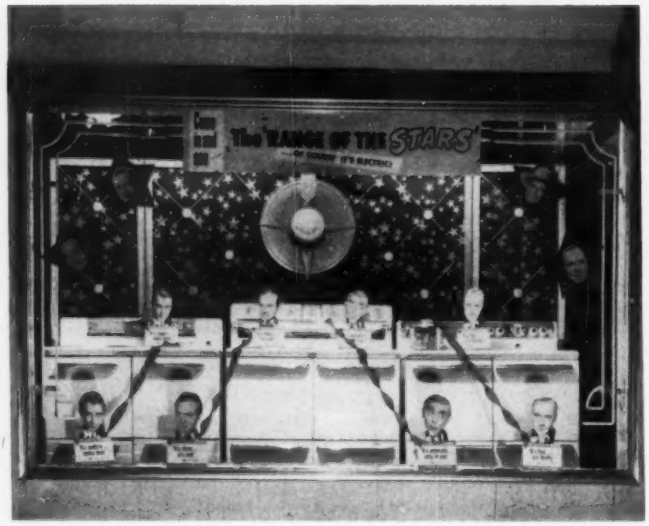
Prizes for Windows Enlist Dealers in Range Program

A double-barreled schedule of cash prizes was set up by the Pennsylvania Power & Light Co to get its "Range of the Stars" promotion rolling. One group of prizes was offered to dealers for best window displays and another to residential sales promotion representatives of the company for inducing dealers to enter the contest. Result was that 794 dealers signed up.

Dealer entries were made by purchases of window display promotional packages. Each package was comprised of a window streamer, 4 star cutouts and 4 easel-backed counter cards. Additionally, the package included 50 "How to Hold a Star" recipe booklets to be passed out to prospects, copies of radio and television commercials suggested for use by dealers, and explanation of the terms of the contest. The kit was sold to the dealer at $2, with additional quantities of any item at comparable prices. The 794 dealers bought 850 of the window display sets, 850 sets of counter cards, and 42,500 copies of the recipe books.

Prizes offered for dealer windows were, first, $25, second, $15, and third, $10, in each company division, and the same series for the best 3 in the company territory. Thus the top winner would get $50, and the runners-up possibly $30 and $20 each.

Prizes to company representatives were in 3 categories. In each division the two representatives with the highest percentages of dealers signed up in their assigned territories would receive $15 and $7.50. Then the representative in whose territory was located the dealer winning the divisional prize would get $10. On top of that, $15, $10, and $5 were offered to the representatives whose dealers won the system-wide contest. Further, for every $1 of sales promotion material sold by him to dealers, each representative received a credit of 25 points on his record of sales. Indicative of the energy with which representatives went after these prizes, or perhaps of receptivity of dealers to the idea, is the number of dealers signed up, well over 3 times as many as the quota.



WINDOW DISPLAY of dealer Joseph Pulicci, Hawley, Pa. in PP&L contest

Range Users Are Best Water Heater Prospects

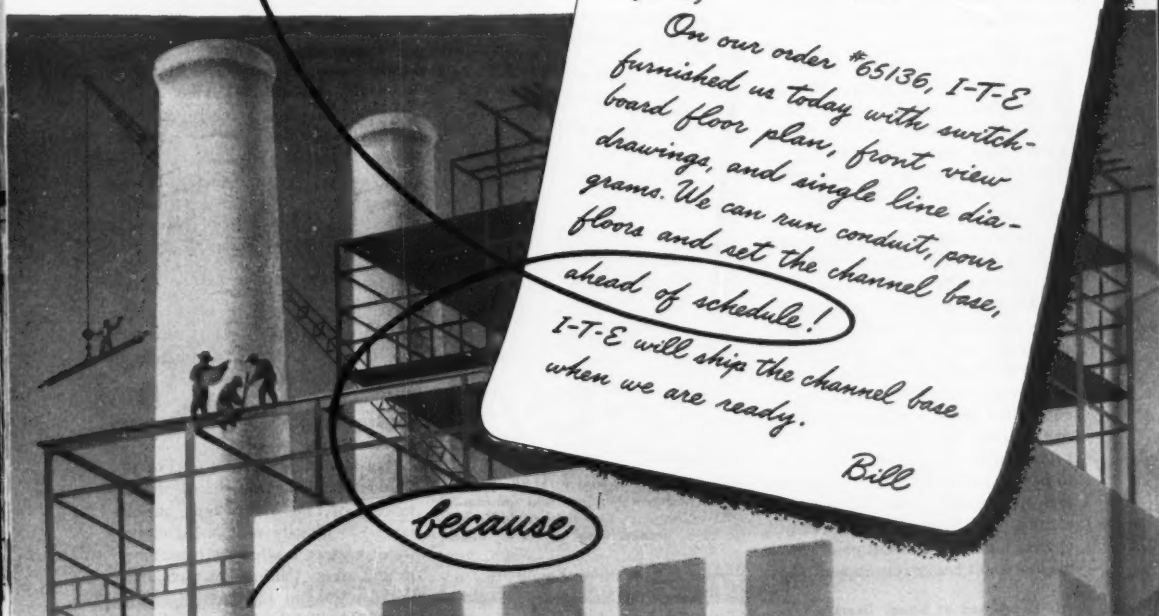
E. A. SNYDER
Sales Manager
American Gas & Electric Service Corporation

Last year 104,000 electric ranges and water heaters were sold to customers of the six companies that comprise the American Gas and Electric System. The bare statement that this record represents the sale of one or the other of these appliances to over ten per cent of the million customers of these companies needs no embellishment. The remarkable aspect of the accomplishment is that of all units sold, 41,300 were electric water heaters.

Two of the system companies received national recognition for their fine work at the recent Edison Electric Institute Sales Conference when they received George A. Hughes awards. Kingsport Utilities and Indiana & Michigan Electric Company won first and second prizes, respectively.

Late in 1949 when we were planning the 1950 load-building program for our affiliated companies, it was decided to make strenuous efforts to improve the ratio of water heater sales

Your construction



Memorandum

From: W L. MARTIN, ENGINEERING DEPARTMENT

To J. Forbes, Construction Department

Subject: I-T-E Switchgear

Jim,

On our order #65136, I-T-E furnished us today with switchboard floor plan, front view drawings, and single line diagrams. We can run conduit, pour floors and set the channel base, ahead of schedule!

I-T-E will ship the channel base when we are ready.

Bill

because

When you build a new building or expand existing facilities, you must have perfect timing in coordinating construction schedules. For example, early in your construction planning you need basic drawings. Naturally, many of these drawings come from your suppliers. If they are tardy, you may have trouble meeting construction schedules.

At I-T-E we take a real interest in the solution of this customer problem. When you buy an I-T-E switchboard or unit substation, your order is placed well in advance of the shipping date. But we know that before you can install the equipment, floors must be poured, conduits provided for, and the channel base grouted in place. To do these things, you need certain switchgear drawings, and if you are like most of our customers, you want them quickly. Consequently, when your order is placed with I-T-E, the drawings you need quickly are prepared promptly. Result: you can complete your floor, spot your conduit and set in your channel base *on or ahead of construction schedules.*

—another reason why I-T-E is your best switchgear buy!

For further information on I-T-E Multumite Switchgear contact your local I-T-E representative or write to the I-T-E General Office.

I-T-E

For *more dependable* Switchgear

—specify I-T-E!

R&IE

I-T-E Circuit Breaker Company • 19th & Hamilton Streets • Philadelphia 30, Pa.

Power Switching Equipment: Railway and Industrial Engineering Co., Greensburg, Pa.

Canadian Mfg. & Sales: Eastern Power Devices, Ltd., Toronto • Export Sales: Philips Export Corp., New York

SWITCHGEAR • UNIT SUBSTATIONS • ISOLATED PHASE BUS STRUCTURES • CIRCUIT BREAKERS • MECHANICAL RECTIFIERS • RESISTORS • SPECIAL PRODUCTS

to range sales. A few years ago, system sales were one water heater for every four ranges. By 1949, this ratio had been brought up to something approximating one to two. We concluded that with a selective water heater load-building activity, it might be raised close to one to one.

After many discussions and some misgivings that such a program might discourage maximum effort, we decided to set water heater quotas in excess of our range quota. This unprecedented plan resulted in our establishing a water heater quota of 50,000 units. This quota was allocated to affiliated companies by taking into consideration the past sales record of each company, the number of customers not using electric water heaters and the number of range customers not using electric water heaters.

This last factor is important because all companies in the system have identically the same water heater clause in their rates. They use a single meter rate with a follow-on block of energy for water heating which is effective after 200 kilowatthours have been used in any month. As a result, to be a water heater prospect, in general, a customer should be operating a range so that his monthly use will approach the 200-kilowatt point where the low water heater rate applies.

Aimed at Range Users

A complete recommended water heater sales promotional program was developed which included increased use of newspaper advertising, direct-mail aimed at all non-users but particularly at electric range customers who do not have electric water heaters, special truck and window display posters, outdoor advertising (for the first time on water heaters), special window display material for both company and dealer use, campaign incentive awards, suggestions for local company campaigns, intercompany competition, dealer-cooperative programs, planned sales calls for salesmen and dealers and the other usual types of promotion. This was a full twelve-month activity with special emphasis on spring and fall seasonal selling periods. Bulletins covering the sales of electric ranges, water heaters and dryers placed major emphasis on electric water heaters.

The American Gas and Electric Service Corporation is, we believe, unique in its field in that it renders a comprehensive sales promotion and advertising service to its affiliates.

Annually, at a sales conference attended by sales managers of all the divisions of the several companies, sales plans and programs are weighed and pooled. From these meetings the

because you have an electric range
you can enjoy electric water heating
at attractive low rates!
a Special Message
TO ELECTRIC RANGE USERS

EFFECTIVE SALES PULLER. Cover decoration and inside fold of mailer tells range users how they could be able to save money with a water heater

Service Corporation's commercial department, acting as a clearing house of ideas, develops plans that are pretty much standardized systemwide. Monthly bulletins showing sales of major appliances by companies and divisions and awards by the parent company at the year's end keep alive an intense competitive spirit.

The home office commercial department includes an advertising section which produces practically all advertising and printed sales promotional material used by the six companies. Actually, this is a syndicated service such as an advertising agency might furnish, and includes newspaper ads in mat form, direct-mail booklets and circulars and a variety of display and poster material.

When the 1950 reports were tabulated it was found that, while we fell short of our goal, our system did produce 41,300 electric water heater sales, this topping the previous high sales year by almost 12,000 heaters. At the same time, over 63,000 electric ranges were being sold by the dealers and our companies, for another all-time high sales record. While we did not sell more water heaters than ranges, we brought the ratio of water heaters to ranges to about one and one half ranges to one water heater—a big improvement over past performances. Over 75% of the total water heaters were sold in the territory served by the Appalachian Electric Power Company, the Indiana & Michigan Electric Company and The Ohio Power Company. Each of these companies added 12,000 water heaters, or over 1000 heaters per month. Incidentally, at the close of 1950, the American Gas and Electric System had a 15% water heater saturation and about a 33% range saturation, indicating that for every two range users we have one water heater user.

Prize Winning Entries

A brief review of the prize winning entries of the two companies that won the George A. Hughes awards is as follows:

Kingsport Utilities, Inc.—Award received by W. B. Jones, dealer sales representative.

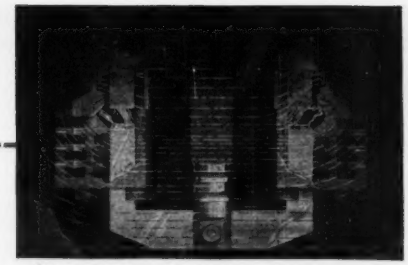
This company served a total of 13,956 residential customers at the beginning of 1950 and of these customers, 4975 already were using electric water heaters, leaving 8981 customers as non-users. During 1950, cooperating dealers and plumbers, following a carefully laid-out plan, sold 1832 water heaters, or 20.4% of the non-users, or 120 sales per 1000 customers. At the end of 1950, Kingsport Utilities has a 45.11% water heater saturation and a 59% range saturation.

Indiana & Michigan Electric Company—Award received by J. H. K. Shannahan, supervisor of residential sales.

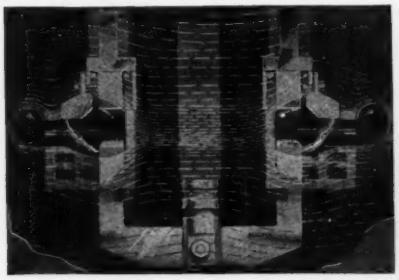
This company served approximately 194,000 residential customers at the start of 1950 and of these customers, 42,000 were using electric water heaters. This meant that at the beginning of our 1950 campaign we had 152,000 customers not heating their water electrically. During 1950, following the general plans outlined herein, 12,674 electric water heaters were sold by our salesmen, cooperating appliance dealers and plumbers. At the end of 1950, Indiana & Michigan Electric Company had a 26% water heater saturation and a 44% range saturation.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

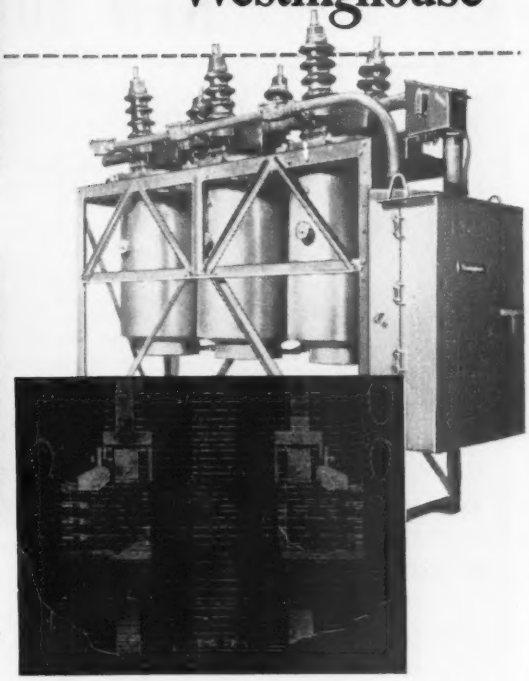


▲Contacts partially open. The arc is lengthened by magnetic action and vaporizes oil. Upper arc terminal has transferred to arc horn.



▲Deionizing action takes place. Un-ionized gas is directed through arc to extinguish it.

Arc completely extinguished. Fresh oil replaces gas in grids. Contacts fully opened. ▶



Exclusive "De-ion®" Grid Arc Control

CHECKS COSTLY OIL DETERIORATION!

Low arc voltage . . . low arc energy . . . these important advantages of "De-ion" Grid arc control assure greatly reduced oil carbonization and deterioration when you use Westinghouse Outdoor, Frame-Mounted Circuit Breakers. You save the cost of frequent oil replacement . . . you're sure of *improved* service continuity.

Rapid control of fault current is accomplished by vaporizing oil trapped in pockets. "De-ion" Grids quench the arc by magnetically forcing it into the grid, where oil provides a fresh flow of un-ionized gas. The dielectric strength is thus raised to a point where the arc cannot restrike. The effect of the "De-ion" Grids is graphically shown by the three progressive illustrations shown here.

Get the facts about all the cost-saving features of Westinghouse Breakers. Call your nearby Westinghouse representative, or write for booklet B-3686-A. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60736

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

Westinghouse

POWER CIRCUIT BREAKERS

WESTINGHOUSE

NEW EQUIPMENT

Air Switch

The use of beryllium in the contact jaw to improve thermal capacity is but one of several design changes incorporated in the R&IE horizontal opening high pressure switch.

Horn mounting assemblies can now be installed to permit clock-or counter-clockwise operation if the blade is reversed. Terminals have been located at even distances from the base permitting straight line bus connections through the switch.

Railway and Industrial Co, Greensburg, Pa.

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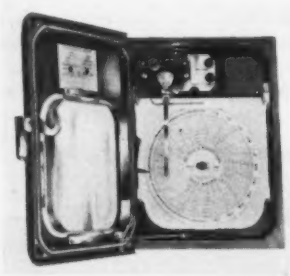

Electric Recorders

A new line of recording voltmeters and ammeters, identified as Series 500, features a moving-iron mechanism which reportedly provides high actuating torque at low electrical burden.

Continuous recordings of voltage or current are made on an 8-in. chart. A variety of models for wall, surface-panel, or flush-panel mounting, for either open terminal or conduit connection, as well as portable and pole mounting are available.

Complete information on models, ranges, specifications, and uses are given in bulletin E1111.

The Bristol Co, Waterbury 20, Conn.

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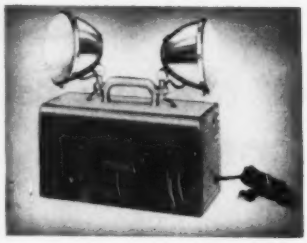
Emergency Lighting

Plugging this lamp into any 110-v outlet furnishes emergency lighting automatically when the regular source of current fails—temporary lighting to prevent confusion and panic in the event of a power failure.



Two independent floodlight heads operate on one 9-volt standard dry battery.

U-C Lite Mfg Co, 1050 West Hubbard St, Chicago 22, Ill.

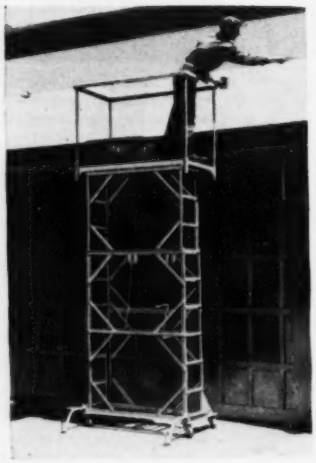
•

Graphite Ground Anode

Greater weight of graphite per unit of exposed surface is said to give a new size (3-in.x60-in.) ground anode longer life.

Furnished with 36-in. insulated No. 8 cable this anode is recommended by the manufacturer for cathodic protection of electric sub-stations, pipe lines, and underground and underwater structures.

National Carbon Co, 100 East 42nd St, New York 17, N. Y.



Servicer

Small enough to pass through an ordinary doorway this one piece servicing unit can be made to reach a 22-ft ceiling without erection.

Sturdy because of its welded steel construction, this unit is well suited for lighting, cleaning, and maintenance. An outrigger brace at the bottom prevents tilting or rolling.

Atlas Industrial Corp, 849 39 St, Brooklyn 32, N. Y.

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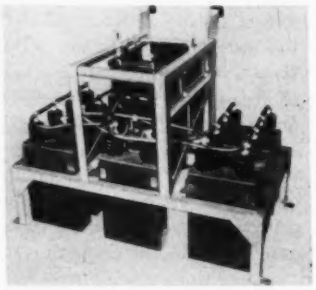
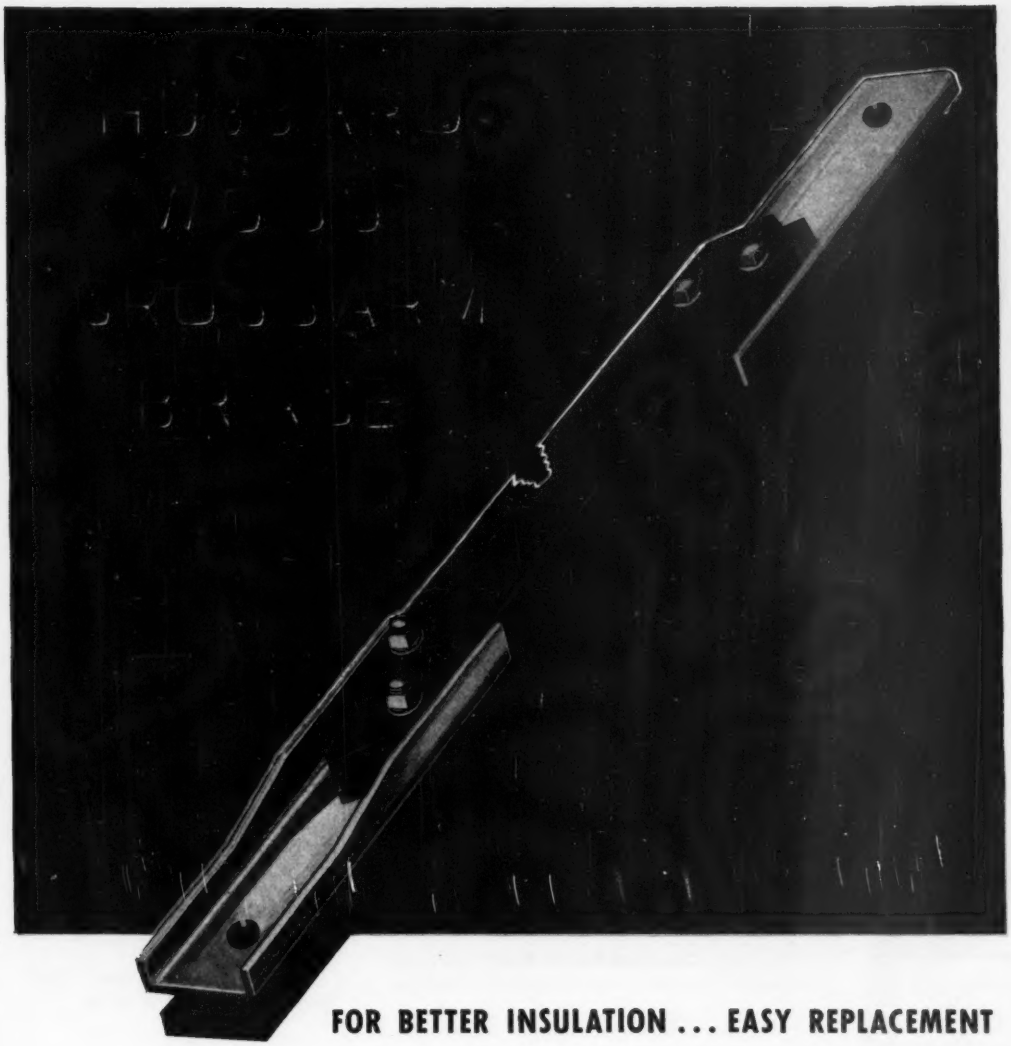


Capacitor Bank

Pole mounted, this 225-kvar switched power factor improvement capacitor bank has been developed for operation on 2,400/4,160 volt three-phase distribution circuits.



FOR BETTER INSULATION ... EASY REPLACEMENT

The Hubbard No. 8128-W Brace makes it possible to replace a standard 28-inch Steel Brace with a Wood Brace, without drilling new holes or otherwise altering the structure. It is designed as a means of increasing the impulse insulation level of medium voltage lines. These Braces may be used singly or in pairs. High strength in compression, as well as tension, is an outstanding feature of this Brace. The Wood Section is 1-inch by 1½-inches, creosote dipped hickory. The channel steel sections are reversed at the ends to permit installation with the flat side of the channels against the crossarm and the pole. Stock No. 8128-W covers a pair of Braces. Braces are interchangeable—there are no lefts nor rights—therefore, even though Braces are ordered and shipped in pairs, they may be used singly. Metal fittings double-dip, hot galvanized.

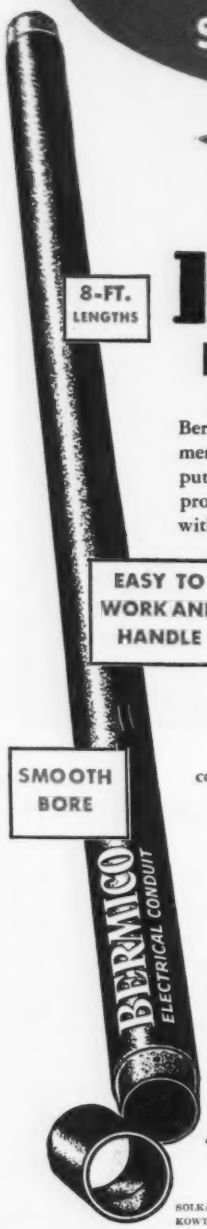
HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

FOR CONDUIT *with the* STRENGTH BUILT-IN SPECIFY



8-FT. LENGTHS

BERMICO®
FIBRE CONDUIT!

Bermico has the strength to meet every conduit requirement — the all-around strength that only wood fibre puts into conduit! It is this tough, durable specially-processed fibre which makes Bermico better able to withstand excessive abuse and rough handling.

EASY TO WORK AND HANDLE

With Bermico you get **Easy Cable Pull.** Its unusually smooth bore prevents chafing or injury to cables being pulled through.

Bermico is **Easy to Work and Handle.** You can do cutting and tooling right on the job! Its 8-foot lengths are light . . . easy to install.

SMOOTH BORE

Bermico's **Complete Line of Bends,** plus angle couplings, enables you to meet unusual field conditions.

On your next construction job, use Bermico — the conduit with the strength built-in. It will give you extra years of trouble-free cable protection at lower cost.

Distributed by

WESTINGHOUSE

Electric Supply Company

Offices in all leading cities

A PRODUCT OF BROWN *Company*

Berlin, NEW HAMPSHIRE

SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWLS • BERMICO SEWER PIPE, CONDUIT & CORES • ONCO INSOLES • CHEMICALS

Arrangement of the electrically operated oil switch and capacitor units is said to provide symmetrical and weight-balanced assembly. Two of these units may be installed from a common cross arm.

Cornell - Dubilier Electric Corp, South Plainfield, N. J.

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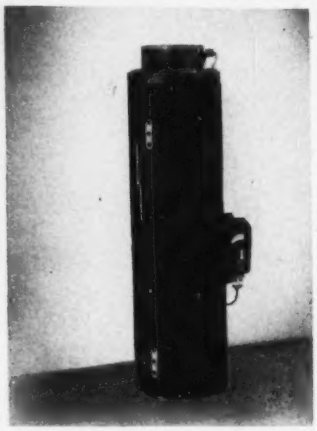

Electric Heater

Fully insulated and equipped with built in automatic temperature control, this circulation heater is useful in preheating oil to make it free-flowing and increase combustion efficiency. This same unit may also be used for heating quantities of water and process chemical solutions.

Heater load is divided into three circuits with conduit openings for each circuit. Ratings of 40, 50, 75, and 100 kw are available.

Edwin L. Wiegand Co, 7513 Thomas Blvd, Pittsburgh 8, Pa.

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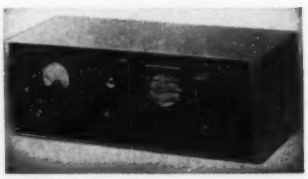


Insulation Tester

Non-destructive insulation testing is possible with the Type 732 5-kv ionization tester.

A variable dc voltage ranging from 250 to 5,000 v is provided by a high impedence source and applied to the insulation under test. Ionization cur-

AVOID DOUBLE TROUBLE

WITH A DE LAVAL

Dirt and water in your turbine lubrication system are double trouble-makers. Get rid of both of them with a De Laval Oil Purifier and give your turbine ***Double Protection.***

By means of centrifugal force applied effectively in the bowl, a De Laval machine throws out any solid impurities that may be present. Once removed, they cannot build up in the separating zone of the bowl to cause loss of purifying efficiency; they remain packed around the bowl periphery until cleaning time.

Any condensate in the oil is thrown out and continuously discharged. Re-contamination is impossible.

De Laval Purifiers cost little to operate—require no replacement of vital parts—and almost no supervision except cleaning.

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

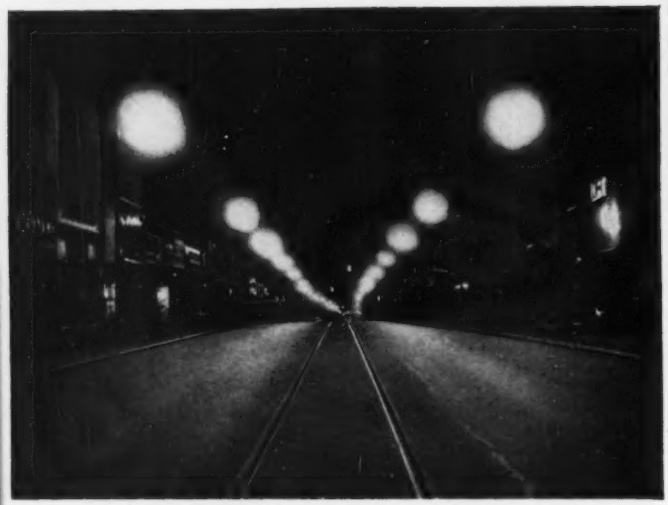
DE LAVAL

for more dependable power production

LUBRICATING OIL PURIFIERS

On New Rochelle's thoroughfares it's

AMPLEX STREET LIGHTING LAMPS



The vastly improved street lighting system in New Rochelle, N. Y., recently installed under the supervision of Mr. E. P. Byrne, the city's Electrical Superintendent.

IN EVERY PART of America, more and more municipalities and public utilities are changing over to Amplex Street Lighting Lamps. Experience shows that these lamps afford notably superior lighting and maintain an unsurpassed degree of light output during their extra-long service lives. Specially designed and built to withstand the constant vibration and jolts of traffic, they bring outstanding savings on every installation.

There's an Amplex street lighting lamp of the right type and wattage for every purpose. And for the last word in ruggedness and dependability Amplex **Weatherproof Bulbs** are your topmost specification. Made of "hard glass", these moisture-resistant lamps stop failures caused by climatic conditions . . . bring down long-run costs.

For full facts about Amplex Street Lighting Lamps and their superiority on the job, write Amplex Corporation, Dept. J-6, 111 Water Street, Brooklyn 1, New York.

AMPLEX

Sealed-Beam Reflector Lamps, Colorbeam Lamps, Spotlites and Floodlites, Industrial Infra-Red Heat Lamps, Vibration and Rough Service Lamps, Street Lighting Lamps, Traffic Signal Lamps, Incandescent Lamps, Fluorescent Tubes, Display Accessories.

rents are amplified to provide an audible indication. Threshold voltage at which ionization occurs is immediately apparent and the test may be discontinued before breakdown occurs. **British Electronic Group, 366 Madison Ave, New York 17, N. Y.**

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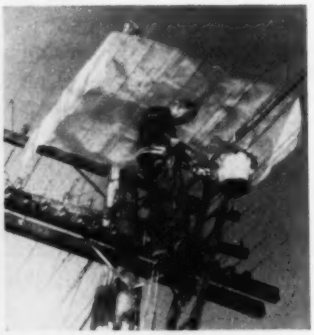

Plastic Tarpaulin

Fabricated of heavy gage Vinylite plastic, Star-Tarp is said to be waterproof and lighter than canvas of comparable strength. Being transparent, it affords protection from the weather and permits workers to use daylight.

It is possible to fold this tarpaulin when wet without fear of rotting or cracking. Its insulating qualities permit it to be thrown over telephone wires without creating disturbance.

Plastic Sheeting Co, 931 S. E. Sixth Ave, Portland 14, Ore.

•

Power Factor Meter

One of the newest hook-on testing instruments, type AK-3 power factor meter, permits direct measurement without cutting conductors on any 3-phase circuit with a range of 100 to

Cables run COOLER... in TRANSITE DUCTS

... reducing copper losses

... increasing current capacity

... prolonging insulation life

HERE'S HOW to reduce copper losses ... increase current carrying capacity ... and prolong insulation life—run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed.

In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric Loss (C)	1.9	2.1
Allowable Rise for Copper Loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	100.

Johns-Manville *Transite Ducts* "KORDUCT"—for encasement in concrete

"CONDUIT"—for use exposed and underground without encasement

IT will help you cut tower painting cost!

SEND FOR *free* COPY

PARTIAL LIST OF CONTENTS

- Tower painting practices
- Analysis of cost elements
- Computed painting costs for various tower weights and surface areas
- Economics of transmission tower painting
- Formulas for computing costs

DIXON 2-COAT SYSTEM
Use **DIXON SILICA GRAPHITE PRIMER AND PAINT** for *maximum* tower protection at *lowest* annual painting cost. Service records of from 7 to 16 years not unusual.

DIXON 1-COAT SYSTEM
Use **DIXON ONE-COAT TRANSMISSION TOWER GRAY PAINT** where initial cost or other requirements dictate the use of a 1-coat application. Ask for test report on remarkable enduring qualities of this paint.

MAIL COUPON BELOW for your free copy of this new and timely engineering manual. Contains valuable data never published before.

Also check coupon for copy of United States Testing Company's report on test of one-coat tower paints.

DIXON
FLAKE SILICA GRAPHITE
PAINTS

SPECIALISTS IN OUTDOOR PAINTS FOR METALS — FOR ALMOST A CENTURY

JOSEPH DIXON CRUCIBLE COMPANY, Paint Division, Jersey City 3, N. J., Dep't. 6E

Without obligation please send me ☐ Copy of your new engineering manual "Transmission Tower Painting" ☐ Copy of U.S. Testing Company report on test of one-coat tower paints ☐ Have your representative call on me.

COMPANY_____

ADDRESS_____

NAME_____ TITLE_____

600 volts and currents of 15 to 600 amperes.

Readings are said to be accurate to within 0.05 power factor. Frequency is 50 to 90 cycles.

General Electric Co, Schenectady 5, N. Y.

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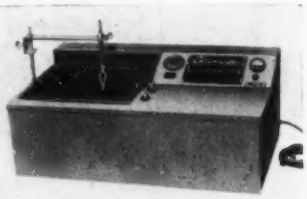

Chrome Plating

Chrome plate may be applied directly on industrial steels, cast iron, and most non-ferrous metals with the A-50 Chromaster. The manufacturer reports that a maximum of 25 sq in. of metal surface can be plated at the recommended current density of 2 amp per sq in.

This unit consists essentially of a built in selenium rectifier power supply, rectangular plating tank, and instrument panel. Current control is by means of a continuously adjustable autotransformer.

Chromasol, a non-critical, concentrated plating solution is available for use with unit.

Ward Leonard Electric Co, 39 South St, Mount Vernon, N. Y.

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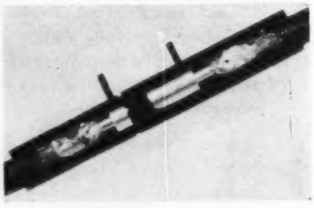

Connector

Cable ends are attached to the Caddy Quick connector by the Cadweld process. In this process a reduction of copper oxide produces molten copper which flows over connector and cable ends welding them together.

Current contact between segments of the connector is made by a wedging action.

The 4/0 connector can be used on 1/0 to 4/0 cable and is rated by the

REASONS WHY POWER MEN PREFER
VICTOR SUSPENSION INSULATORS

V CONTROLLED FORMING *plus* smooth, hard glaze give unsurpassed self-cleaning characteristics. Maintenance costs are reduced, especially in contaminated areas.

V ALL METAL PARTS are hot-dipped galvanized to assure maximum resistance to weathering and corrosion.

V SPECIAL "CUSHION" COATINGS at all joining surfaces eliminate problems caused by thermal variations and mechanical shock.

V CONTROLLED TESTING and PROCESSING of cement provide high bond strength at all assembly joints.

V HEAVY OUTER EDGE of porcelain provides added resistance to chipping.

V RUGGED, THICK CORRUGATIONS and smooth, rounded edges give maximum resistance to mechanical impact.

VICTOR NO. 900 SUSPENSION INSULATOR
For complete engineering data on this and other sizes and types of suspension units, write today for Bulletin No. 4.

Features like these are just an indication of the vast amount of research and engineering which go into the design and manufacture of VICTOR Suspension Insulators. No wonder power men prefer VICTOR Suspension Units.

Do You Know that...

Every porcelain insulator produced at VICTOR is subjected to the most rigid controls throughout its entire manufacture . . . from laboratory tests on every lot of raw materials to routine high frequency and 60 cycle flashover with modern testing equipment? Result—VICTOR insulators more than meet industry standards.

Specify
VICTOR
SUSPENSION INSULATORS

VICTOR INSULATORS, INC. VICTOR, N. Y.

RCA MICROWAVE SYSTEM

Two links of receiving and transmitting antennas of Central Arizona Light & Power Co., located on roof of generating plant.

RCA Microwave Transmitter-Receiver. The generating plant and each switching station has a transmitter-receiver.

SINCE June 1949, the Central Arizona Light & Power Company, Phoenix, Arizona has used an RCA Microwave System for remote control of switchgear . . . telemetering of voltage, current and power . . . two-way voice communication —between a generating plant and two remote switching stations.

Despite severe lightning storms, temperatures of 140 F, unusual exposure to wind, sand, dust, and insects, RCA Microwave equipment has provided excellent continuity of service.

Reliable Performance, Lower Costs

This modern system of communication costs 'ess per mile to construct and operate than conventional wire or carrier current systems. Parabolic antennas focus transmitted signals to span distances up to 35 miles. Repeater stations provide a path for signals over mountains, rivers and rolling countryside. The equipment is designed for unattended operation and may be installed at locations which are inaccessible for periods of several months. Channels are provided for supervisory control, teleprinter, facsimile, two-way radio, and many other circuits.

RCA engineers are at your service for consultation on microwave systems. Write to Dept. R-31 for complete information.

MICROWAVE COMMUNICATIONS SECTION
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

manufacturer at 500 amp. The female (hot line) end of the connector is completely enclosed by the insulator.

Eirco Products Inc, 2070 East 61 Place, Cleveland 3, Ohio

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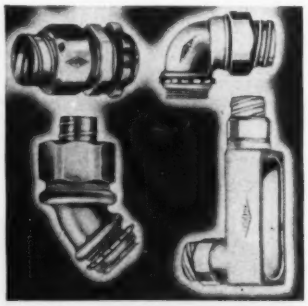


Conduit Fittings

Recommended by the manufacturer for use with synthetic covered flexible metallic conduit in locations which have water, oil, or corrosive fumes, Vap-Oil-Tite fittings are designed to insure a positive ground.

Fittings and bodies are furnished in sizes ranging from ⅜ to 2-in.

Simplet Electric Co, 3602 Potomac Ave, Chicago 51, Ill.

•

Weatherproof Junction Box

Used with lamp holders as illustrated, new weatherproof junction boxes are reportedly effective for property-line and other protective lighting. Made of cast aluminum and provided with four hubs tapped ½-in. IPS, it is available with or without mountings lugs. A separate aluminum coverplate

HERE'S PROOF

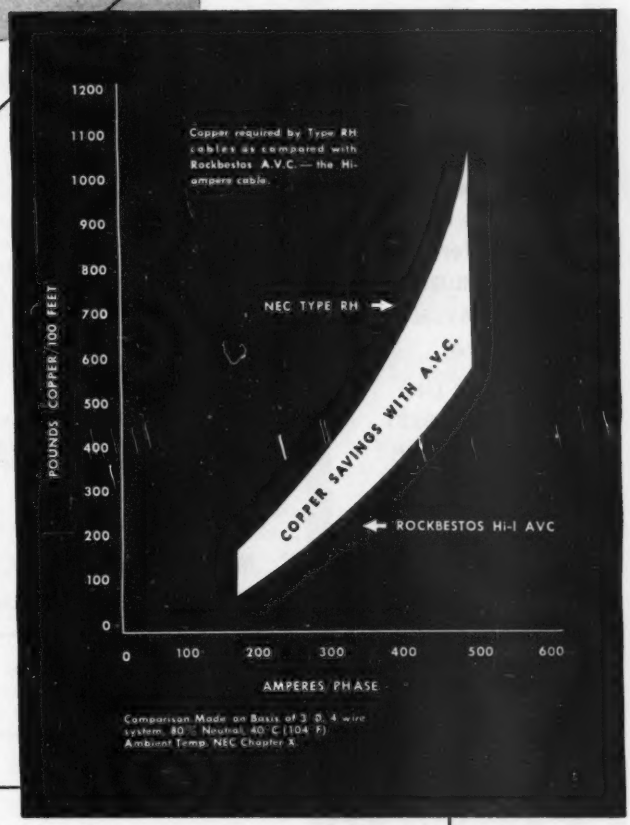
1 lb. of copper will do the work of 1.6 lbs. when you use

Hi $I = \frac{E}{R}$

Your best buy

ROCKBESTOS A.V.C.®

(CODE TYPE AVA)



Size for size Rockbestos A. V. C. carries more current than ordinary cables. And that's why it makes your critical copper and steel go farther.

You always use a smaller cable with Rockbestos A.V.C. Smaller cable requires *less* copper and smaller conduits and fittings on your power circuits. You save copper — save steel — save time and money.

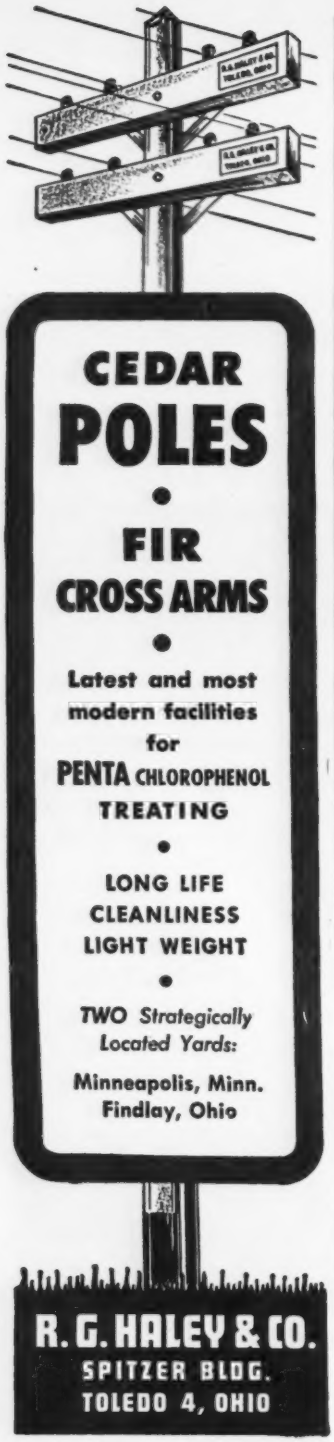
Where voltage drop and power losses are critical, proper engineering allowances should be made.

Call your Rockbestos Application Engineer *today*. Ask for a copy of "Rx for a Building with Hardening of the Arteries."

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN 4, CONNECTICUT

NEW YORK · ST. LOUIS · CLEVELAND · LOS ANGELES · DETROIT · OAKLAND, CALIF. · CHICAGO · NEW ORLEANS · PITTSBURGH



is tapped to take standard lamp holders for 150, 200, and 300-w outdoor weatherproof reflector bulbs.

Stone Manufacturing Co, 489 Henry St, Elizabeth 4, N. J.

•

Gaussmeter

Scaled in six ranges, the D-79 Gaussmeter, is reported to have an accuracy of 2½% from 10 to 30,000 gauss for both ac and dc magnetic fields.

New, entirely non-magnetic probe is said to be capable of indicating magnitude and direction of flux density in an air gap 0.25-in. wide having an area of 0.01-sq. in.

Flux value is obtained as a steady reading on a dc meter movement.

Dyna Labs Inc, 132 Lafayette St, New York 13, N. Y.

MORE NEW PRODUCTS about which you should know

Curtis Lighting, Inc, 6135 W. 65th St, Chicago 38, Ill., is manufacturing the Curtistrip **wire channel** large enough to accommodate ballasts to operate slimline, starter-type, and low-brightness fluorescent lamps; lengths from 4 to 10 ft, one or two lamps.

Wodack Electric Tool Corp, 4627 W. Huron St, Chicago 44, Ill., offers a portable **electric hammer and drill** utilizing one motor for (1) drilling concrete and masonry, (2) drilling metal and wood, (3) driving grinding or buffing wheels. Drilling range is from ¼ to 1⅜ in.

Union Insultating Co, Parkersburg, W. Va., has an automatic **door light switch.** When installed in cupboards, lamp lights when door is open, goes off when door is closed. . . . Lor-Ann Instrument Co, Jersey City, N. J., is marketing a portable, explosion-proof gas analyzing instrument for detecting flammable or explosive gases.

Cornish Wire Co, Wired Assemblies Div, Rutland, Vt., has an all-moulded-rubber **junction block** which functions as an integral part of wiring system. . . . American Sand-Banum Co, Inc, 9 Rockefeller Plaza, New York 20, N. Y., is offering Tinallium Pro-Tex-It **preservative** in the form of a non-drying black paste. Adaptable for metals, woods, and concrete mixes, it reportedly protects against weathering, acids, alkalis, fumes, etc.

Magnetic Amplifiers, Inc, 11-54 44th Drive, Long Island City 1, N. Y., has announced a new line of packaged, standard **magnetic amplifiers** for automatic control and servomechanism application at frequencies of 60 and 400 cps, and capacities to 350 w. . . . Southwestern Industrial Electronics Co, 2831 Post Oak Rd, P. O. Box 13058, Houston 19, Tex., has developed Model M-2 **oscillator** for the frequeny range one to 120,000 cps. Power consumption is 125 w at 115 v, 60 cycles.

General Electric Co, Apparatus Dept, Schenectady 5, N. Y., has available a **tungsten electrode** for inert-arc welding with dc, straight polarity using either argon or helium. It can be used to weld mild steel, stainless steel, copper, and alloys. . . . Simonds Machine Co, Inc, Southbridge, Mass., has developed Models T-51-S and T-52-S Treadlite **footswitches** for 5 amp, 110 or 250 v.

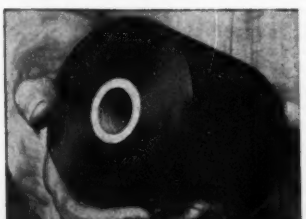
Daven Co, 191 Central Ave, Newark 4, N. J., offers Type 170 **electronic voltmeter** covering frequency range from 10 cycles to 250 kc. Input impedance is 500,000 ohms. Also can be used as a wide-range, high-gain amplifier. . . . Rossaul Co, 170 Fifth Ave, New York 10, N. Y., is making Copper-Brite, a **bright dip** for brass, copper, bronze, and nickel silver; said to remove oxides in 3-sec dip.

MIDWEST UTILITY COMPANY PROVES IT ON BURIED HIGH-VOLTAGE CONDUCTORS...

Plastic tape knocks the tar out of tough coating jobs!

Hazardous, hard-to-handle hot tar coatings are a thing of the past, now that plastic-backed "SCOTCH" Electrical Tape No. 22 protects buried conductors against corrosion. A midwest utility company recently completed installation of 1¼ miles of underground high-voltage pipe type cable, and the entire surface of three inch copper risers was given safe, dependable protection with this tough tape. Galvanic action and earth acids are sealed out; resistance to fungi and bacteria very high.

On every kind of job, small or large, "SCOTCH" Electrical Tape No. 22 can cut your costs, save you time, without the messiness and danger of hot coatings. Patching and repairing are easier, too! No activator is needed for the adhesive—it sticks with simple finger pressure. See your jobber today.



WIDE ROLL of "SCOTCH" Electrical Tape No. 22 covers large areas quickly. Tape is also available in 36-yard rolls and in widths of ½, ¾, 1 and 2 inches. Contains no sulphur-bearing compounds.

Quick Facts About "SCOTCH" Electrical Tape No. 22

- ★ **TOUGH**—plastic backing resists oil, water, acids, alcohols, weather
- ★ **STRETCHY**—conforms snugly to any surface
- ★ **HIGH DIELECTRIC**—over 10,000 volts
- ★ **THIN CALIPER**—only .010 inch thick

SCOTCH BRAND Electrical Tape No. 22

The term "Scotch" and the plaid design are registered trade-marks for the more than 100 Pressure-sensitive adhesive tapes made in U.S.A. by **MINNESOTA MINING & MFG. CO.**, St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing "3M" Abrasives, "3M" Adhesives. General Export: Minnesota Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N. Y. In Canada: Canadian Minnesota Mining & Mfg. Co., Ltd., London, Ont.

BE PREPARED FOR POSSIBLE SHORTAGES

Is your power wiring program liable to be hampered by shortages of critical materials, required to conceal it?

You can still proceed by using open wiring carried on "Three E" clamp insulator supports.

They are economical, easy to install, and provide a rigid support.

Made for insulated conductors ⅜" to 3½" in diameter. Satisfactory for A.C. or D.C. service, indoors or outdoors. Three E carries ample stocks for prompt shipment.

Ask for Bulletin 201 giving complete description and listings.

ELECTRICAL ENGINEERS EQUIPMENT CO.

MELROSE PARK, ILLINOIS

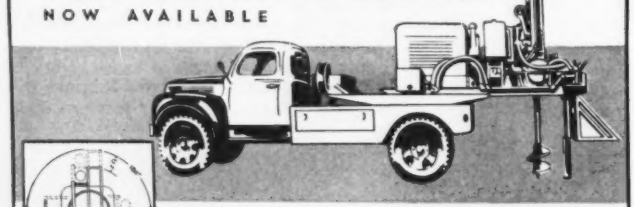
STERLING

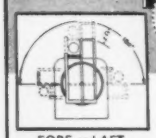
EARTH BORING MACHINE

HYDRAULIC OPERATED TURNTABLE

FORE AND AFT MOUNTED

NOW AVAILABLE





FORE and AFT DIAGRAM

180° rotation plus extention and retraction horizontally for two feet "Fore & Aft" at any point within this travel is made possible through the adaptation of hydraulic power which is the main feature of the STERLING Earth Boring Machine. This mounting is especially valuable in digging holes while the truck is parked along side of the curb in highly congested areas of most of our cities. There is no need to back in to each hole and tie up traffic for any length of time. This feature plus many others which have already been adapted to the STERLING Earth Boring Machine assure you of being able to do your job FASTER, BETTER and CHEAPER. Write for Bulletin "FA" which describes this adaptation in fuller detail.

Wyoming Valley Equipment Company

FORTY FORT, PENNSYLVANIA

STERLING - INDUSTRY'S "ACE IN THE HOLE"

TECHNICAL LITERATURE

Gas Turbines—Publication 50-1, *Gas Turbines*, is intended to acquaint the reader with the general status of the gas-turbine industry today. Included in the five-page report are statements by Allis-Chalmers, Elliott Co, General Electric, Westinghouse, and a number of foreign manufacturers. There is also a floor plan for the Beznau Station, 40,000-kw gas-turbine installation in Switzerland. Price is 20¢ to members of Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

Metal Identification—Those persons concerned with scrap problems, stocking of various metal products, or sorting of alloy parts should find ASTM Publication No. 98 of particular interest. *Symposium on Rapid Methods for the Identification of Metals* contains nine comprehensive papers presented at the 52nd Annual Meeting of ASTM. There are papers on spot test analysis, electro spot testing, instruments for rapid identification, separating alloys (including copper-base alloys), alloy and stainless steels, and protective coatings. Copies of the 84-page booklet, STP No. 98, may be obtained for $1.75 from American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa.

Lag Screws—*Specifications for Lag Screws* covers lag screws commonly used in overhead line construction. These standards are not intended to be mandatory, but they are urged on the basis of simplified stock and manufacturing requirements. Material, dimensions, threads, strength, and preferred sizes and kinds are among topics included. Publication TD-3 may be secured from Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

Noise Measurement—Uniform methods of conducting and recording sound-level tests on apparatus are established by *American Standard Test Code for Apparatus Noise Measurement*, Z24.7-1950. Included are procedures for factory tests of equipment, field investigations, and sound-level specifications. Price of the Standard is 50¢ from American Standards Association, 70 E. 45th St, New York 17, N. Y.

Abbreviations for Drawings—The 1950 edition of *American Standard Abbreviations for Use on Drawings* contains special new sections on abbreviations for colors, valves, and screw threads. The section on abbreviations and letter symbols for cable and magnet wire now includes colors of cable and magnet wire. Over 200 abbreviations have been changed, and more than 40 new ones added since the 1946 edition. Publication Z32.13-1950 may be obtained for $1 per copy from American Standards Association, 70 E. 45th St, New York 17, N. Y.

Economics—*Symposium on the Role of Non-Destructive Testing in the Economics of Production.* Six extensive papers and discussions included in this 164-page symposium are intended to present unbiased views explaining the actual or potential values of the various methods of non-destructive testing in promoting higher quality or more economical production. Copies can be obtained from American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa.

Transformers—*Recommended Standards for Distribution Transformers.* This first report contains design standards for certain mechanical and electrical features of conventional subway-type distribution transformers with high voltage 2400-15,000 volts, low voltage 600 volts and below, rated 167 kva and smaller single-phase, 150 kva and smaller three-phase. Available for 60¢ from Edison Electric Institute, 420 Lexington Avenue, New York, N. Y., or National Electrical Manufacturers Association, 155 East 44 St, New York, N. Y.

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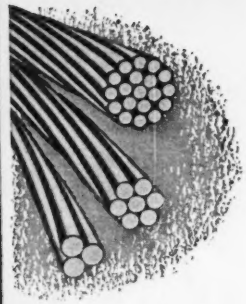


Stainless Steel
STRAND
AND
Stainless-Copper
CONDUCTORS

Here's WHY they Save

Compared with other types strand of equal breaking strength, they . . .

- **have 30-40% greater overload capacity within elastic limit.**
- **resist corrosion all the way through—not merely through a thin case of soft metal.**
- **offer highest tensile and vibration-fatigue strength (tensile strength 235,000 psi; corrosion-fatigue limit 50% of ultimate).**

Here's HOW they Save

- **They permit longer spans—therefore require fewer poles per mile.**
- **Being lighter, they are easier and faster to install in the field.**
- **More resistant to destructive factors, they last many times as long before replacement.**

Let us tell you the whole story—

specific data, prices, recommended sizes.

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

WHAT THEY'RE SAYING
at industry meetings

Deferments For Engineers

J. C. McKeon, *manager, University Relations, Westinghouse Electric Corp, before the Lehigh Valley section of the American Institute of Electrical Engineers, Bethlehem, Pa.*

Deferment of competent engineering students should not be thought of as discrimination or the granting of privilege, but as an obligation in the national interest. Manpower-wise, we are outnumbered by the forces of communism. We must secure and hold a commanding lead in scientific research, engineering developments, and industrial production.

Such an undertaking requires trained men. The cold fact is that we don't have enough technically trained men to meet our industrial and military needs. Sound policy must dictate whether engineering graduates should be drafted and reservists called. Failure to train and properly utilize our potential leaders would be national suicide.

Sales Methods Change

Merrill E. Skinner, *vice president, Union Electric Co of Missouri, before 17th annual Edison Electric Institute Sales Conference.*

Conventional sales methods must be re-evaluated and judged by today's conditions. Flexibility, full use of all available working tools, and frequent contact with others in the field can enable the sales manager to meet changing conditions as they arise.

Coal Consumption in 1965

L. R. Ludwig, *assistant to the vice president, Westinghouse Electric Corp, before the American Mining Congress Coal Show, Cleveland.*

Recent figures indicate that the electric utility industry will consume about 108 million tons of coal in 1951. This will put the industry alongside the steel industry as a principal market for coal. We have estimated that annual sales of kilowatt-hours will rise from about 275 billion in 1950 to 634 billion in the next 15 years. Using the 1950 ratio of coal to kilowatt-hours we find that the electric utilities will be using about 211 million tons of coal annually by 1965.

Engrave

PANELS UP TO
25" WIDE
IN YOUR OWN SHOP
WITH THE *NEW*
ENGRAVOGRAPH
Portable Model 1-S

- The *only* portable machine which reproduces *15* sizes from one master alphabet.
- The *only* one with *adjustable* copy holding slides for multiline engraving in one set-up.
- Self-centering holding vise for nameplates and dials.

- **Send for Booklets**
- **I-S 48—portable model**
- **H-48—heavy duty model**

new hermes
Engravograph
NEW HERMES, Inc.
13-19 University Place, N. Y. 3, N. Y.
—CANADA 359 St. James St. Montreal
World's Largest Manufacturer of Portable Engraving Machines

A major contribution to the successful transmission of electric power is General Electric gas-filled, high-voltage cable. Service failures are practically eliminated and repair and maintenance problems are reduced to a minimum, since this type of cable is self-supervising.

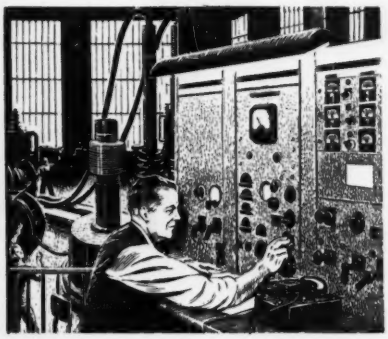
WIRE AND CABLE for electric utilities

Designed

TO REDUCE SERVICE FAILURES

Proved

BY ACTUAL FIELD CHECKS



By laboratory testing of samples taken from cables actually in operation and by frequent field checks, General Electric helps to maintain its integrity as a manufacturer of power transmission cables of the highest quality.

INSULATION RESEARCH
DESIGN ENGINEERING
LABORATORY TESTING
CONTROLLED MANUFACTURING
FIELD SERVICE
INTEGRATED EXPERIENCE

We at General Electric know that uninterrupted service is your important job. For this reason, we make electric transmission cables with insulation intended to keep outages and service failures to an absolute minimum. Day after day, year after year—in the laboratory and in the field—we prove to ourselves that this objective is being accomplished.

For example: G-E gas-filled high-voltage transmission cable—more than a million feet—has been in use for more than 12 years without a single outage due to inherent insulation failure. However, in order to reassure ourselves and our customers of the stability of this product, a small section of an early installation was recently removed and exhaustively tested. Result? No sign of insulation deterioration or other defect.

If you believe, as we do, in thoroughness of research, painstaking care during manufacture, and vigilant checking after installation, won't you let us show you how these basic qualities can help resolve your power transmission problems—aid you in providing improved service for your subscribers? *General Electric Company, Construction Materials Department, Section W60-627, Bridgeport 2, Conn.*

You can put your confidence in—

GENERAL ELECTRIC

STEEL in STOCK

for Suppliers of Power and Light

Convenient to electric power and light companies from coast to coast, thirteen Ryerson steel-service plants stand ready to supply these utilities and their equipment manufacturers.

True, shortages resulting from the twin pressures of defense requirements and unprecedented civilian demand may make it impossible for us to furnish every item on every order, much as we would like to. But it is likely that many of your requirements are among the carbon, alloy and stainless steels we have on hand for prompt shipment. And experienced Ryerson steel men are always glad to work with you—help you make the most of available steel.

From switchboard to shipping floor all of us are ready to give you prompt service whenever humanly possible. So call us for every steel need.

PRINCIPAL PRODUCTS

BARS—Carbon and alloy, hot rolled and cold finished, reinforcing bars, etc.
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate, Inland Hi-Steel, etc.
SHEETS—Hot and cold rolled, many types and coatings
TUBING—Seamless and welded, mechanical and boiler tubes, structural tubing, etc.
STAINLESS—Allegheny sheets, plates, bars, tubes, pipe, pipe fittings, etc.
BABBITT METAL—Ryerson Glyco in 5 grades
MACHINERY & TOOLS—for metal fabrication

RYERSON STEEL

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
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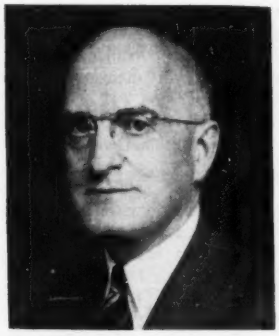
NEWS ABOUT PEOPLE

Cook Named President of Lynn Gas & Electric

James A. Cook, vice president, has been elected president of Lynn (Mass.) Gas & Electric Co. He succeeds H. Morris Kelly who has been named chairman of the board.

Cook will continue as general manager, a position he has held since 1934.



J. A. COOK

He began his career doing apprentice work at the Sprague Works of General Electric Co. In 1914 he joined the Cleveland Construction and Warren Bicknell companies in Cleveland. Following that he became a member of the engineering staff of D. C. & William B. Jackson, with headquarters at their Chicago office.

Cook spent the next six years with New York Edison Co as assistant superintendent of the test department. Then he became assistant engineer of the distribution and installation department of the utility.

Joining Lynn Gas & Electric in 1925, Cook served as general superintendent of the electrical department until 1934 when he was appointed general manager. He became vice president in 1947.

•

W. R. Brownlee has joined the general engineering department of Southern Services, Inc, Birmingham, Ala. He had been associated with Commonwealth Services, Inc, Jackson, Mich., as supervisor of power systems engineering. Previously he worked for Tennessee Electric Power Co.

•

Sylvania Reorganizes Lighting Sales Division

Sylvania Electric Products, Inc, has reorganized its Lighting Sales Central Division into three separate divisions—the St. Louis Division, the Chicago Division, and the Milwaukee Division. The Milwaukee Division will have temporary headquarters in Chicago.

W. J. Rashleigh, formerly assistant division manager for the Central Division, has been appointed sales manager of the Chicago Division. He has been with Sylvania since 1945, starting as a field representative in California.

Heading the Milwaukee Division as sales manager is Paul T. Owens. He had been sales representative of lighting products in the Central Division. Owens joined Sylvania in 1943 as sales representative in Chicago.

Myles Gaythwaite, who had been assistant manager of the Cleveland Division, has been named sales manager of the St. Louis Division. He became associated with Sylvania in 1941 to handle lamp contracts for the Central Division in Chicago.

•

William T. Johns Jr, regional manager of the Rumsey Electric Co, Philadelphia, has been named vice president of the company. He will continue at his present headquarters in Richmond, Va.

A. Raymond Martin has been promoted to local superintendent at Rocky Mount, Va., by Appalachian Electric Power Co. With Appalachian Electric since 1936, he has been serving in the accounting department at Fieldale. In his new position Martin will have charge of the company's activities in Franklin County and part of western Pittsylvania County.

Pepco Names Pearce General Superintendent

Thomas C. Pearce has been appointed general superintendent, electric system, of Potomac Electric Power Co, Washington, D. C. He had been superintendent of the substation department.

In other promotions Wesley L. Hatton has been made superintendent of the substation department, succeeding Pearce; Elwood G. McAfee, assistant superintendent of the substation department, replacing Hatton; John R. O'Hanlon, engineer assistant to the vice president in charge of operations; and Fred W. Reeder, administrative assistant to the vice president in charge of operations.

T. C. PEARCE

Pearce has been with Pepco for 30 years. In his new position he will direct the operations of the company's distribution, power dispatcher's substation, meter, motor transportation, and building operations departments.

Hatton came to Pepco in 1919 and had been assistant superintendent of the substation department since 1941. McAfee, who succeeds him as assistant superintendent, joined the company in 1923 and had served as operating foreman in the substation department.

•

J. E. Dews, manager at Stuttgart for Arkansas Power & Light Co, has been named eastern division manager for the company. He succeeds **W. H.**

STRETCH
EQUIPMENT DOLLARS

Your equipment investment goes much farther when you equip your crews with Mighty-Midget Pullers. On many jobs, a Mighty-Midget can efficiently do the work of hoisting equipment costing up to ten times as much. Yet there is no sacrifice of Coffing quality for low cost. Every Mighty-Midget is built for day-after-day service . . . each is factory tested at 50 percent overload.

RAISE LABOR EFFICIENCY

The Mighty-Midget is a valuable extra hand on line work as well as for indoor installations. Weighing only 6½ lb., it hangs lightly on a tool belt, yet its 500-lb. capacity enables one man to do the lifting, holding, stretching work of many. (1,000-lb. model weighs but 9½ lb.)

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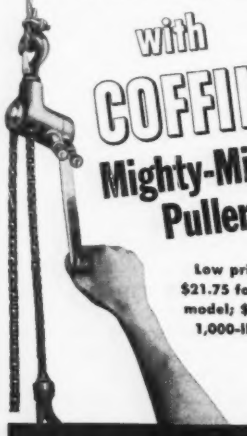
Skilled hands go farther, too, for the Mighty-Midget Puller relieves the burden of countless lifting jobs . . . eliminates the necessity of calling highly paid specialists from their work to lend a hand.

Write for Bulletin E6MP.



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Quik-Lift Electric Hoists • Hoist-Alls • Safety-Pull Ratchet Lever Hoists • Spur-Geared Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys

Howze who is retiring because of ill health. Dews joined Arkansas P&L's meter department in 1925 and later served as power salesman in the Brinkley-Wheatley-Hunter area and as local manager at England. He was made manager at Stuttgart in 1937.

Temp S. Davis, Jr, sales supervisor of Georgia Power Co's Rome division for the past 14 years, has been named manager of the utility's Community Development Division.

Lawrence E. Judy has resigned as manager of the Skagit County PUD, Mount Vernon, Wash., for "harmony and promotion of the best interests of the district." He has been under criticism lately.

•

Chase Brass & Copper Makes Bruce Dean VP

Chase Brass & Copper Co, Waterbury, Conn., has elected Bruce A. Dean vice president in charge of sales.

B. A. DEAN

He had been general sales manager of the Mengel Co, Inc, Louisville, Ky.

Dean previously had been with General Electric Co in sales and management activity. He also has served as an industrial consultant.

•

S. B. Mansell, assistant superintendent of transmission and distribution in charge of the meter division of the Jacksonville (Fla.) Electric Department, has been elected president of the Southeastern Metermen's Association. **C. L. Drummond,** general meter superintendent of Georgia Power Co, and **L. B. Boaz** meter superintendent of the Nashville (Tenn.) Electric Service Board, were named vice presidents.

Manufacturing Managers Named by Westinghouse

Westinghouse Electric Corp has appointed four regional managers of manufacturing in its Lamp Division. They are Matthew Westphal as manager of northeastern lamp plants at Bloomfield and Trenton, N. J.; William J. Williams as manager of parts plants in Bloomfield and Belleville, N. J., and Paris, Tex.; Elwood W. Noxon, manager of southern lamp plants at Richmond, Ky., Bowling Green, Ky., and Little Rock, Ark; and James E. Woodall, regional manager at Fairmont, W. Va.

Westphal joined the company as a machine maintenance man in 1924 and most recently has been superintendent of large lamp manufacturing at Bloomfield. Williams started in 1916 as a factory manager. He served at East Pittsburgh, Pa., in the Gearing Division at Pittsburgh, and in the Merchant Marine Division at Lester, Pa., before going to Bloomfield in 1945. He will continue as manager of equipment manufacture and maintenance for the Lamp Division.

Noxon has been manager of the Richmond, Ky., lamp plant since it opened in 1948. He joined the company in Brooklyn, N. Y., in 1924 as a manufacturing engineer and in 1942 became superintendent of miniature lamp manufacturing in Bloomfield. Woodal joined the company 27 years ago, became manager of the base plant in Belleville, N. J., and went to Fairmont as manager in 1949.

•

John Wiehe and **Walter Wenzel** have been named heads of a new plant engineering and planning department at the Norwood (Ohio) Works of Allis-Chalmers Manufacturing Co. The department will handle further planning in a modernization program underway at the works. Wiehe has been superintendent of machine shops for Allis-Chalmers since 1927 and Wenzel general superintendent of manufacturing since 1943.

L. J. Gorman, engineer in charge of electrolysis studies and corrosion control for Consolidated Edison Co of New York, has retired after 40 years' service. He joined New York Edison Co, a Con Ed predecessor company, in 1911 working on electrolysis studies in the testing department. Since 1921 he has had charge of all electrolysis

surveys and mitigation in the company's pipe and cable systems. He recently became associated with Robin Beach Engineers Associated and will continue as a consultant with the firm.

A. Hadley Taylor, physicist on the engineering department staff of General Electric Co's Lamp Division at Nela Park, Cleveland, has retired after more than 30 years of service. He specialized in the field of lighting research during his career with GE.

G. E. Korten, general street lighting supervisor of Consumers Power Co. has joined the editorial staff of "Street Lighting Magazine" as associate editor.

Albert W. Wentzell, treasurer of Nova Scotia Light & Power Co, has retired after 39 years of service. He began with the utility as a clerk in 1912. He later became chief clerk, accountant, and in 1925 treasurer.

OBITUARY

Morris Tracy, 65, senior assistant comptroller of Niagara-Mohawk Power Corp, died May 19 near Portland, Ore., while on a motor trip through the West. He came to Syracuse in 1934 as treasurer of the 12 companies which in 1937 were consolidated into the Central New York Power Corp. At that time he was elected vice president and treasurer of the company and made an assistant comptroller of the Niagara-Hudson Power Corp, the parent company. He was named senior assistant comptroller of Niagara-Mohawk in 1950.

Ward S. Patterson, 46, executive assistant to the vice president in charge of engineering of Combustion Engineering-Superheater, Inc., died at Mt. Kisco, N. Y., on May 21. He had been with the company since 1926. As executive assistant he was responsible for research and development, particularly in connection with controlled circulation for boilers.

William Tietze, 73, retired power engineer, died May 17 at Brookfield, Wis. He was an operating engineer at A. O. Smith Corp, for 18 years and prior to that was chief engineer at the power plants of the Cudahy Brothers Co and the former Power Mining Machinery Co, Cudahy, Wis.

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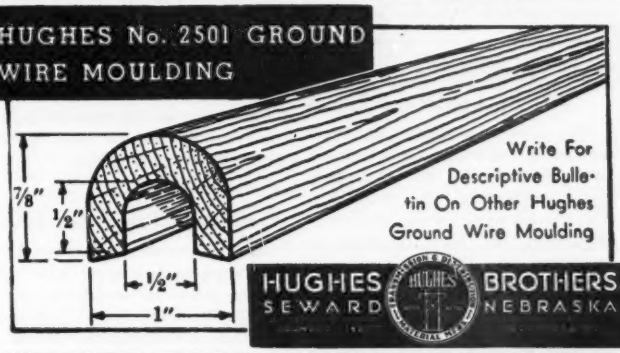

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SEWARD NEBRASKA

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STAR PORCELAIN CO.
51 Muirhead Ave. Trenton, N. J.

MANUFACTURERS and MARKETS

POLE DISTRIBUTION YARD pictured above is part of recently opened treating plant of Southern Pine Lumber Co at Dibol, Tex. The plant, situated in a 20-acre clearing, has two treating cylinders eight ft in diameter, one 87 ft long and the other 50 ft long. Capacity will be 75,000 pressure-treated poles a year. Pentachlorophenol treatment of lumber will be one of the processes used at the new plant

'Fair Trade' Decision May Affect Appliance Prices

The price of electrical appliances may be affected by the recent Supreme Court decision that fair trade contracts are binding only on retailers who consent to sign them. Fair trade price-fixing has been common on appliances.

The backbone of the fair trade pricing system has been the non-signer clause of 45 state laws. This clause empowered a manufacturer to compel all distributors of his products in any fair trade state to observe his resale price schedule if he had a signed written contract with just one distributor in the state. Price cutters were hailed into court for unfair competition.

The Supreme Court ruled, in a 6-3 decision, that the non-signer clause is not covered by exemption from the anti-trust laws granted to fair trade contracts by Congress when it enacted the Miller-Tydings admendment to the Sherman Act in 1937. This amendment permitted states to pass their own laws authorizing minimum price agreements on nationally advertised products.

The court handed down its decision in connection with a case involving liquor prices in Louisiana.

•

Produces Clamps for BPA

Boeing Airplane Co, Renton, Wash., has begun production of 18,000 high-tension power line suspension clamps for the Bonnevile Power Administration, under a $140,000 contract. A production line of five employees turns out about 360 clamps a day. This clamp-production unit handles all receiving, assembly, shipping, and clerical work involved, making the operation almost entirely self-sufficient.

Metal Prices
May 28, 1951

COPPER, Conn. V., lb	$ .24½
LEAD, N. Y., lb	.17
ZINC, prime Western, E. St. Louis, lb	.17½
TIN, Straits, qual. N. Y., lb	1.39
ALUMINUM, ingot, base price	.19
NICKEL, base price	.50½
STEEL, billets, Pitts., ton	56.00
STEEL, scraps, No. 1 heavy Pitts., ton	45.00

GE to Enlarge Turbine Plant at Schenectady

General Electric Co will build a major addition to its turbine plant in Schenectady, N. Y., to boost the factory's annual output of fuel-fired generating capacity by more than 1,250,000 kw.

The extension will add more than 80,000 sq ft to the million-sq-ft structure, already the largest turbine manufacturing facility in the world. Cost of the addition, new equipment, and for rearranging facilities is estimated at $6.5 million.

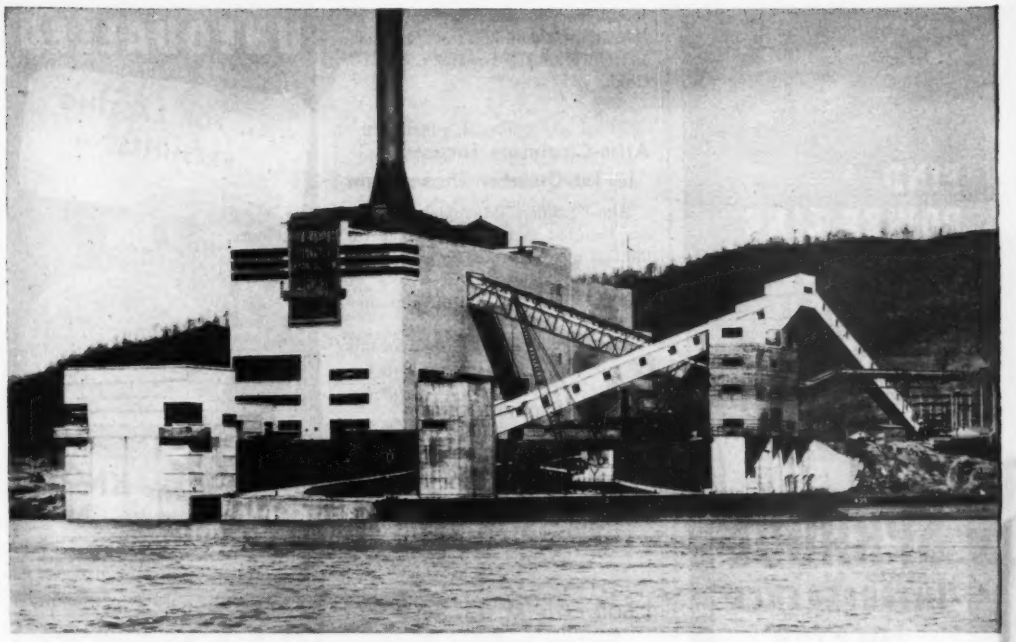
The company's objective in enlarging the plant is to incorporate all major steam turbine manufacturing facilities in one building. When the addition is built the factory will be capable of producing approximately 73 turbine generators representing 5.5 million kw annually.

The new plant-extension, to be built by Stone & Webster Engineering Corp at one end of the quarter-mile-long building, will eliminate bottlenecks in processing operations and streamline the flow of materials. Improved facilities for shipping and receiving are also included in this expansion. Rearrangement of and additions to the manufacturing facilities will eliminate backtracking and zigzagging and result in a streamlined flow in the production line.

•

Lighting Report Released

A new report summarizing the present-day services of illumination in American industrial production, in public safety, in research and education, and in government has been prepared by the National Information Committee on Lighting. The 24-page report, "Lighting and The Nation's Welfare," covers five major topics—production lighting, office lighting, protective lighting, public safety lighting, and education lighting. The report may be obtained for 15¢ per copy in quantities of 100, and 10¢ per copy in lots of 500 or more. Single copies cost 25¢. Requests



Unique Circulating Water System Cuts Plant Construction Costs

There's a suggestion here for anyone building a power plant considerably above the source of circulating water—to save on construction expense and cost of pumping.

Here is how the Ohio Edison Company saved money in construction of its R. E. Burger Steam-Electric Plant.

This plant is located on the Ohio River well above flood stage—which may reach as much as 60 feet above extreme low water. The problem of lifting water to the condensers was solved by a patented circulating water system pioneered jointly by Worthington and the consulting engineer, Mr. George W. Saathoff.

All major equipment except circulating pumps, which are designed to operate completely submerged if necessary, are located above flood stage, with only slight increase in pumping requirements, compared with a "low-level" plant. This avoids all expensive excavation and substructure cost of locating the condensers in deep pits while keeping the turbine generators above flood stage. The long exhaust connection between turbine and condenser is also eliminated.

WORTHINGTON EQUIPMENT SELECTED THIRD TIME

The new installation of a Worthington 70,000 sq ft two-pass condenser and auxiliaries, serving a 90,000 kw turbine-generator, is the third Worthington unit in this station. Its design is based upon successful experience with two 46,000 sq ft condensers previously installed.

For advice on any new installation or information on a wide range of power plant equipment, consult Worthington Pump and Machinery Corporation, Steam Power Division, Harrison, New Jersey.

HOW IT WORKS

Two full-capacity circulating pumps are used in series.* The primary pump, submerged below extreme low water, is a Worthington motor-driven HIFLO. Its high starting head characteristic is able to deliver enough water for starting purposes. A booster pump—a single-suction volute Worthington MIXFLO, mounted directly upon an hydraulic turbine—starts when there is enough water in the control well. The two pumps then operate automatically in series at full capacity.

Advantage is taken of maximum siphon effect from the condenser drop leg which enters the sealing or control well. From this well, all circulating water is passed through the hydraulic turbine. Thus the static head from sealing well to river level is utilized—75-80% being recovered—in reducing the work of the primary pump, with considerable saving in overall pumping power.

The booster pump functions until rising water renders the turbine ineffective. Then the primary HIFLO works alone, producing full capacity under reduced head.

*In the new unit, there are two half-capacity primary pumps, permitting operation of only one in the winter when low water temperatures prevail.

WORTHINGTON

WORLD'S BROADEST LINE OF STEAM POWER PLANT AUXILIARIES

Feed Water Heaters	Boiler Feed Pumps	Steam Turbines
Steam-Jet Ejectors	Water Treating Equipment	Surface Condensers

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SPRAGUE INTERFERENCE LOCATOR

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- Compact, rugged, easy to operate.
- Utilizes 8-tube superheterodyne circuit. Frequency range from 550 kc to 30 mc.
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- Features include loop and collapsible rod antennas, built-in loudspeaker, built-in dual range output and battery test meter, calibrated r-f and audio gain controls, and beat frequency oscillator.

Write for Bulletin PF-601

SPRAGUE ELECTRIC COMPANY
North Adams, Mass.

should be addressed to National Information Committee on Lighting, 1410 Terminal Tower, Cleveland, Ohio.

•

Allis-Chalmers Income in 1st Quarter Shows Gain

Allis-Chalmers Manufacturing Co has reported that its net income for the first quarter of 1951 was $4,579,755. This compares with a total of $4,373,733 for the first three months of 1950.

The first-quarter net income for this year is equal to $1.70 a common share as compared with $1.62 for the same period last year.

In the first quarter of 1951 billings amounted to $87,305,871, and bookings, $140,823,104. For the corresponding period in 1950 billings totaled $74,091,907, and bookings, $78,047,812.

•

1,500-Mile Microwave System to Serve Pipeline

A Pulse Time Modulation multichannel microwave radio relay system, will be constructed by the Michigan-Wisconsin Pipe Line Co to serve its natural gas pipeline from Hansford County, Tex., to the Michigan-Wisconsin area. It will be one of the longest microwave systems ever used for industrial communications, covering a total distance of approximately 1,500 miles.

The system is designed to provide as many as 23 voice channels, but only seven will be utilized initially in this installation, with facilities for VHF mobile radio connection, dispatching, administrative, and supervisory services.

•

Britain, Alcan Make Deal

The United Kingdom has agreed to buy half the projected output of the $550-million aluminum expansion program planned by Aluminum Co of Canada. Alcan has ordered an immediate start on the first phase of the project (EW, May 7, p 152). Aluminum production is scheduled for 1954. The agreement calls for shipments by Alcan of 50,000 metric tons annually to the United Kingdom from 1952 to 1955 and gives Britain first call on an additional 50,000 tons. Britain, in

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turn, will advance Alcan $40 million against unsecured interest-bearing notes maturing 20 years from Jan. 1, 1954.

•

Machinery Profits Up in '50

Profits after taxes of electrical machinery manufacturers in 1950 were estimated at $668 million, up 74% from 1949 and 56% over 1948. Figures compiled by the Securities and Exchange and Federal Trade Commissions placed profits before taxes for the electrical machinery makers at $1,326 million, up 111% from 1949. Profits after taxes for all manufacturing corporations in 1950 were estimated at $12,864 million. This amount represents an increase of 43% over the figure for 1949.

MANUFACTURING BRIEFS

Corning Glass Works, Corning, N. Y., will cease manufacturing glass bulbs for television tubes at its Albion, Mich., plant. Instead, the plant will make sealed beam headlights and glass bulbs for electronic equipment and incandescent lights. Reason for the change is the declining demand for television tubes.

Sylvania Electric Products, Inc, Salem, Mass., will build a $1-million addition to its plant in Towanda, Pa. The one-story, 110,000-sq ft addition will be used to increase production of chemical and tungsten products. Construction of the new facilities will begin soon and completion is expected by fall.

SALES ASSIGNMENTS

COMPANY STAFFS

Electric Service Manufacturing Co, Philadelphia, has named Glenn R. Smith district sales manager of its Washington, D. C., office. He had served in the Detroit office. Walter W. Dearolf, Jr, replaces Smith in the Detroit office of the company.

REPRESENTATIVES

Penberthy Injector Co, Detroit, has appointed Energy Control Corp, 5 Beekman St, New York, representative for its line of gages and values in eastern Pennsylvania, southern New Jersey, Maryland, and Delaware.

A well-rounded analysis

in an easy-to-read capsule form

The INTEGRATED POWER SYSTEM

As the Basic Mechanism for Power Supply

Note what reviewers have said about this book:

"The author, a leader in the power industry, has produced a book unique and dynamic by describing the human, social, and economic objectives as well as the physical and technical means to realize these ends. The book should be read by all executives, engineers, and administrators whose jobs it is to obtain more economic power systems".

—ELECTRIC LIGHT AND POWER

"It is particularly refreshing to see a man like Philip Sporn do a very thorough job of expounding the concepts of modern electric power systems in only 146 pages".

—GENERAL ELECTRIC REVIEW

"Philip Sporn's latest book is of unquestionable value as a source of general information on the organization, development, and operation of an integrated system".

—RURAL ELECTRIFICATION

By PHILIP SPORN

President, American Gas and Electric Company

157 pages, 5½ x 8, 28 illus., $4.00

THIS BOOK presents a compact, easy-to-read survey of the economic, sociological and technical aspects of the integrated power system as a source of the adequate electric power so important in conserving our natural and human resources. It considers the economic advantages of the system, also analyzes the multitude of technical considerations involved, pointing up the coordination necessary to achieve the full results of which the integrated system is capable.

Check this book for information on the integrated system such as:

- its advantages and disadvantages
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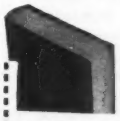
- importance of skilled coordinating personnel
- sources of power
- components and tools
- how it develops latent energy
- its social economic position
- and many other questions



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SOLDERING LUGS

NEW ELECTRICAL CONSTRUCTION

A weekly selection of U. S. electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is indicated or implied

UTILITIES

Proposed Construction

Arizona—Bureau Reclamation Dpt. Interior, Phoenix, one autotransformer, one 115,000 volt transformer and one 115,000 volt circuit breaker for Prescott sub-station, Davis Dam Proj., Spec. 330S-26. L. N. McClellan, Bldg. 1-A, Denver Federal Center, Denver, Colo., ch. engr.

California—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b., cars shipping point or f.o.b cars Lindsay, Calif., switchgear assembly, indoor distribution transformer for Trauger Pumping Plant, Central Valley Proj., Spec. DS-3436. L. N. McClellan, ch. engr.

Colorado—Bureau Reclamation, Dpt. Interior, Grand Lake, Oak Creek sub-station and garage and shop, Colorado-Big Thompson Proj., Spec. 704C-177, L. N. McClellan, Bldg. 1A, Denver Federal Center, Denver, Colo., ch. engr.

Ga., Augusta—Georgia Power Co., 78 Marietta St. N.W., Atlanta, electric power plant, Approx. **$1,000,000.**

Idaho, Idaho Falls—Idaho Operations Office, U. S. Atomic Energy Comn., Idaho Falls, installing electric equipment in substation control houses and associated substations. Plans deposit $10.

Illinois—State Div. Hys., Springfield, electrical and misc. maintenance sect., Dist. 10, servicing and maintaining traffic control signal system at 153 locations, etc., Cook Co.; servicing and maintaining traffic control signal systems at 37 locations, in Lake, McKenry, DuPage, Kane, Will and Kendall Counties.

Ky., Louisville—General Electric Co., River Rd., Schenectady, N. Y., plant to mfg. jet engine parts, incl. five 600x1,000 ft. bldgs., 300x2,000 ft. warehouse, administration and laboratory, railroad yards, **$14,000,000.**

Mich., Boyne City—Northern Michigan Electric Co-operative, Sect. 6C, superstructure; Sect. 8, mechanical work for Advance Steam Plant, Stanley Eng. Co., Hershey Bldg., Muscatine, Ia., engr.

Mich., Detroit—City, Pub. Wks. Dpt., City Hall, Zone 1, constr. and alterations water, drainage sys., relocation city lighting and power facilities along John C. Lodge Expressway, UI 82-127, C55. Plans deposit $3. M. H. Frimodig, 222 Townsend St., Lansing, Zone 13, engr.

Minn., Hibbing—Village, Pub. Utilities Comn., E. A. Anderson, secy., furnish, erect 2 steam generating units in municipal power plant, $750,000. Plans deposit $25, Pfeifer & Shultz, 702 Wesley Temple Bldg., Minneapolis, engrs.

Missouri—Central Electric Power Cooperative, Jefferson City, Sect. 1, 9 substations, Sect. 2, six 161,000 volt circuit breakers, Sect. 3, 20 outdoor metering outfits, Sect. 4, 2 steel sub-stations structures, equip., Sect. 5, carrier current and relay equip., Boone, Howard, Randolph, Monroe, Audrain and Callaway Counties, Frank Horton & Co., Lamar, engrs.

Montana—Bureau Reclamation, Canyon Ferry, Canyon Ferry-East Helena 115-kilovolt transmission lines, 2 parallel, 3-phase, single-circuit, wood-pole H-frame type lines approx. 8 mi. long, each with 2 overhead ground wires, Missouri River Basin Proj. Spec. DC 3434.

Montana—Bureau Reclamation, Dpt. Interior, Billings, one 2,000 kva. and one 15 kva transformer, one 14,400 volt circuit breaker, two 115,000 volt air switches, three 115,000 volt disconnecting fuses, nine 15,000 volt disconnecting switches, one 7,800 volt fuse cutout three current and three potential transformers, Missouri River Basin Proj., transmission div., Spec. 600S-57, L. N. McClellan, Bldg. 1A, Denver Federal Center, Denver, Colo., ch. engr.

N. M., Los Alamos—U. S. Atomic Energy Comn., Jos. R. Turan, chief, Contract Div., electrical distr. sys., TA-3 to TA-16, Inv. No. 291-51-133. Approx. **$105,000.**

N. Y., Schenectady—General Electric Co., River Rd., 80,000 sq. ft. generator plant adn. **$6,500,000.**

Ore., Corvallis—State Bd. Control, University of Oregon, Eugene, furnish, erect steam boiler, turbine generator and switchgear at Oregon State College. $300,000. Plans deposit $25. W. Bruce Morrison, Cascade Bldg., Portland, engr.

Ore., Eugene—Eugene Water & Electric Bd., City Hall, water control structure for Waterville pumper storage project. Plans deposit $25. Cornell, Howland, Hayes & Merryfield, Corvallis, engrs.

Texas, Louisiana, Mississippi, Alabama, Tennessee, Kentucky, West Virginia, Pennsylvania—Texas-Ohio Gas Co., c/o J. R. McAuliffe, 1310 McKinney St., Houston, Tex., 1,500 mi. 30 in. welded joint natural gas pipe line from Texas coast, near Wharton to Pennsylvania near Scranton, **$170,000,000.**

Va., Richmond—Virginia Electric Power Co., 7 and Franklin Sts., building addn., 7 and Franklin Sts. **$2,020,000.**

Washington—Bureau Reclamation, Dpt. Interior, Ephrata, Wash., electrical distr. sys. at Long Lake Dam, Columbia Basin Proj., Spec. 117C-103. L. N. McClellan, Bldg. 1-A, Denver Federal Center, Denver, Colo., ch. engr.

Wyoming—Bureau Reclamation, Dpt. Interior, Thermopolis, completing Boysen Dam, Power Plant, and Switchyard, Big Horn Dist., Boysen Div., Boysen Unit, Missouri River Basin Proj., approx. 18 mi. south of Thermopolis, Spec. DC-3430. L. N. McClellan, Bldg. 1-A, Denver Federal Center, Denver, Colo., ch. engr.

Low Bidders & Contracts Awarded

Calif., Pasadena—Allis-Chalmers Mfg. Co., 1126 S. 70 St., Milwaukee, Wis. Contract Awarded. **$1,188,242.** furnish steam turbine generator, appurtenances for Light and Power Dpt., City, City Hall, Pasadena, Calif. Awarded May 15.

Mass., Natick—Thos. Worcester, Inc., 84 State St., Boston, Mass. Contract Awarded. Est. **$2,000,000.** radar plant, Lake Cochituate. Laboratory for Electronics, Inc., 11 Leon St., Roxbury, Mass.

Neb., Grand Island—Allis-Chalmers Co., 9 and Farnam Sts., Omaha, Neb., Contract Awarded. **$350,089,** generating equip. and building alterations. City, Grand Island, Neb. Lutz & May, Finance Bldg., Kansas City, Mo., engrs.

N. M., Los Alamos—Vinson Constr. Co., Box 930, Phoenix, Ariz., Low Bidder, **$609,029.** building and facilities, Groups 141-144 Area TA-16, Proj. 1, Inv. No. 291-51-86. U. S. Atomic Energy Comn., Los Alamos, N. M. Bids May 10.

N. Y., Bath—H. K. Ferguson Co., 19 Rector St., New York 6, N. Y. Design Construct, **$6,000,000** 1 story mfg. plant to produce electronic tubes. Westinghouse Electric Corp., Union Bank Bldg., Pittsburgh, Pa.

N. Y., Horseheads—H. K. Ferguson Co., 1119 Rector St., New York, 6, N. Y., Design and Construct **$3,000,000** 1 story mfg. plant to produce electronic tubes on 11100 acre tract. Westinghouse Electric Corp., Union Bank Bldg., Pittsburgh, Pa.

South Dakota—Allis-Chalmers Mfg. Co., 1127 S. 70 St., Milwaukee, Wis. Contract Awarded, **$2,864,740.** hydraulic turbines for Fort Randall Reservoir, Proj. Inv. 92, near Lake Andes. U. S. Eng., 1709 Jackson St., Omaha, Neb. Bids Apr. 5.

Tex., Fort Worth—Lone Star Gas Co., 1915 Wood St., Dallas, Tex. Purchase and Hire. **$150,000.** new unit electrical distr. or transmission line.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Pa., Phila. — Integrity Improvement Corp., School House and Gypsy Lanes, apartment development, School House Lane, etc. **$22,500,000.**

Pa., Phila.—Equitable Life Assurance Society, 393 7 Ave., New York, N. Y., apartment development, vicinity of Independence Square Mall. **$10,000,000.**

Tex., Houston — Shell Oil Co., Shell Bldg., benzine plant. $12,330,000.

Va., Hopewell—Continental Can Co., Hopewell, factory expansion. **$7,350,846.**

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A. C. Generator ..... 473,000 kw.
Steam Turbine ..... 634,048 hp.
Northwest Plant
3400 N. California Ave.
Plant Engr. ..... P. G. Dahl
A. C. Generator ..... 216,000 kw.
Steam Turbine ..... 288,204 hp.
North Counties Hydro-Electric Co.
97 W. Van Buren St.
Pres. ..... Fred D. Brett
Gen. Supt. ..... H. M. MacGregor
Dayton, Ill.
Total Capacity
A. C. Generator ..... 2,650 kva.
Hydro-Turbine ..... 3,500 hp.
See plant at Dayton, Ill.
Public Service Company of Northern Illinois
72 W. Adams St. Zone 3
Controlled by Commonwealth Edison Co., Chicago, Ill.
Pres. ..... Britton I. Budd
V. Pres. Chg. Opr. ..... J. L. Hecht
V. Pres. ..... H. P. Sedwick
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Mgr. Pwr. ..... E. C. Williams
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Elec. Engr. ..... A. D. Caskey
Mgr. Elec. Prod. ..... J. L. Wade
Gen. Sales Mgr. ..... A. H. Schneider
Pur. Agt. ..... C. D. Auringer
Total Capacity
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Hydro Turbo-Generator ..... 600 kw.
A. C. Distribution ..... 120-240 V. 2 & 4 wires. 1 & 3 ph. 60 cy.
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Elec. Engr. ..... John T. Harley
Elec. Opr. Engr. ..... F. A. DeMuth
Mech. Engr. ..... Wm. J. Dundas
Pur. Agt. ..... H. E. Wallace
Total Capacity
A. C. Generator ..... 25,000 kva
Hydro-Turbine ..... 27,000 hp.
Total Power Purchased 140,000,000 kw.hrs. per year
See plant at Lockport, Ill.
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OFFICIAL PROPOSALS

Bids: September 3, 1951

Notice Re Extension of Time for Tendering

DEPARTMENT OF THE CO-ORDINATOR-GENERAL OF PUBLIC WORKS, BRISBANE, QUEENSLAND, AUSTRALIA
TULLY FALLS HYDRO-ELECTRIC PROJECT
SPECIFICATION NO. TF/5—PENSTOCK AND HAULAGE
AND
SPECIFICATION NO. TF/6—TUNNEL AND SURGE TANK

Prospective Tenderers for either of the above Contracts are hereby advised that the final date for receipt of Tenders has been extended from July 2nd, 1951, to September 3rd, 1951.

C. E. PETERSEN
Secretary
Department of Co-Ordinator-General of Public Works.

Bids: September 3, 1951

Underground Power House, Shafts and Tunnels

DEPARTMENT OF THE CO-ORDINATOR-GENERAL OF PUBLIC WORKS, BRISBANE, QUEENSLAND, AUSTRALIA
TULLY FALLS HYDRO-ELECTRIC PROJECT
SUPPLEMENTARY SPECIFICATION NO. TF/6A

Tenders closing at noon on the 3rd September, 1951, at the office of the undersigned are invited for the construction of a Pressure Shaft and Tunnels, Underground Power House, Access Shaft, Tailrace Tunnel and Associated Works as an alternative to the works covered by Specification No. TF/5, Penstock and Haulage, and Specification No. TF/6, Tunnel and Surge Tank, previously issued.

Particulars may be obtained from the Chief Engineer, Department of the Co-Ordinator-General of Public Works, corner Melbourne and Gray Streets, South Brisbane, the Queensland Government Liaison Officer, Room 121, 82 Pitt Street, Sydney, and the Queensland Government Liaison Officer, 435 Bourke St., Melbourne, from whom copies of plans and Specifications are available.

The lowest or any tender will not necessarily be accepted.

Tenders should be endorsed—"Tender—Tully Falls Hydro-Electric Project, Underground Power House and Conduits."

C. E. PETERSEN
Secretary
Department of the Co-Ordinator-General of Public Works, Box 185C, G.P.O., Brisbane.

ENGINEERS

ELECTRICAL - MECHANICAL - STRUCTURAL

Openings in Ohio and New York offices offering long term employment with good salary for qualified Group Leaders, Designers and Draftsmen experienced in one or more of the following phases of industrial plant design:

Electrical	Power, lighting layouts and electrical controls.
Mechanical	Plant layout, process piping, conveyors, heating and ventilation, boiler houses, process equipment layout, refrigeration, plumbing, tanks and vessels, packaging equipment, special machinery and equipment.
Structural	Structural steel and reinforced concrete.

Please submit complete resume stating experience, education, salary required and availability date.

THE H. K. FERGUSON COMPANY
Engineers and Builders

The Ferguson Bldg. 1783 E. 11th St. Cleveland 14, Ohio
19 Rector Street New York 6, N. Y.

POSITION VACANT

Man needed to take charge of casting department in High Voltage Insulator plant. Must have a successful experience record, and be fully familiar with the technique of producing high quality cast porcelain insulators, meeting customers' specifications both dimensionally and electrically. Write full information regarding your qualifications to

P-9928, Electrical World
520 N. Michigan Ave., Chicago 11, Ill.

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GRADUATE MECHANICAL ENGINEERS

For employment in Power Station design engineering with a public utility. Various openings available for men with general layout, piping, and drafting experience. Location, Western Pennsylvania. Qualifications, experience record, salary desired, and picture should be submitted with letter of application.

P-9897, Electrical World
330 W. 42 St., New York 18, N. Y.

FOR SALE

1—Westinghouse Single Phase Induction Regulator, 47KVA, 2400 Volt, 60 cycle 200/400 Amp. immediate delivery. Price $1,500 F.O.B. Los Angeles, California.

THE KNICKREHM CO.
659 S. Rampart Los Angeles, California

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P-9936, Electrical World
330 W. 42 St., New York 18, N. Y.

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TRANSFORMER AND ACCESSORIES for ELECTRIC MELTING FURNACE
ALL WESTINGHOUSE MAKE

One—Transformer 900KVA 3-ph. 50-cy. primary 6600V second. 235/222/205V.
One—Steel operator's panel and contact type regulator.
One—Metal clad switchgear for above transformer, including buses, connectors, current transf., potheads.
Three—One H.P. 230V DC electrode motors.
ALL NEW AVAILABLE FOR INSPECTION IN NEW YORK WAREHOUSE.

CI-5-7646 or
FS-9881, Electrical World
330 W. 42 St., New York 18, N. Y.

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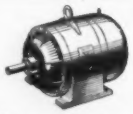
Electric Motors, AC
Electric Motors, DC
Motor generator sets
Transformers
Oil Circuit breakers
Control Equipment



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Slip ring motors
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POWER EQUIPMENT COMPANY
8 Cairn Street, ROCHESTER 2, N.Y. P.O. Box 534

FOR SALE
THREE 150KVA G. E. TRANSFORMERS
34500/21050 volts, (5 steps) to 2400/4160Y, practically new.

LIMESTONE ELECTRIC CO.
Limestone, Maine

WANTED

New and Used Equipment Available for
POWER PLANTS, SUBSTATIONS, TRANSMISSION LINES AND CONSTRUCTION
Send for new list to
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APPARATUS EXCHANGE Two Rector St., New York 6, N. Y.

WANTED
MG Set, or Generator Only
Suitable for obtaining a minimum of 15 Kva, single-phase, at 240 cycles minimum—

MOLONEY ELECTRIC COMPANY
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NETWORK TRANSFORMERS

19—150 KVA G.E. rebuilt submersible or vault type network transformers that are type HT, form DW, three phase, 60 cycle, Primary Volts: 27060; Secondary: 216Y/125, cont. 55° rise. Tap Voltages: 27060/26385/25705/25300/24355. Each transformer is complete with MG6 submersible type heavy duty network protector and primary switch. Complete with oil and accessories. Serial number 5098247.

8—200 KVA ditto. #5005381.

PHILA. TRANSFORMER CO.
2829 Cedar St. Phila. 34, Pa.
GArfield 6-1800

FOR SALE

2—Late 2000 KW GE Turbo Generators
1—1000 KW GE Turbo Generator—Cond.
2—4000 HP Synchronous Motors—257RPM
1—Rotary Compressor 60000 CF/H @ 4#
1—IR Compressor 20,000 CF/H at 100#
1—10" Centrifugal Pump 2000 GPM at 50 hd.
1—Deaerating F.W. Heater 10,000#/hr.

Utility Equipment & Construction Co.
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Anything you want
that other readers of this paper can supply
OR—
Something you don't want
that other readers can use, advertise it in the
Searchlight Section

25 Cycle Equipment
FOR SALE

2 - 6000 KVA Westinghouse A. C. Turbo Generators.
2 - Condensers for above
1 - 150 KW Westinghouse D. C. Generator Exciter Set.
1 - Frequency Changer Set.
13 KV, 25/60 Cycle, 5600 KVA.

—•—

600 Volt Conversion Equipment

2 - 1500 KW, 25 Cycle Rotary Converters.
4 - 1000 KW, 25 Cycle Rotary Converters.
1 - 2000 KW, 25 Cycle Rotary Converter.

—•—

2 - 1500 KW, 60 Cycle M. G. Sets, 13 KV.
1 - 2000 KW, 60 Cycle M. G. Set, 4 KV.
1 - 1000 KW Mercury Arc Rectifier.

—•—

LOUISVILLE GAS and ELECTRIC COMPANY
311 W. Chestnut Street
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FOR SALE
COMPLETE
STEAM POWER PLANT

5—714 HP Combustion Engineering WATER TUBE BOILERS, with Ebasco Superheaters, Sturtevant High Pressure Economizers, Green Chain Grate Stokers, Hagan Combustion Controls, Copes Feed Water Regulators, Clarage Forced Draft Fans, with Hoppers, Automatic Coal Conveyors, Automatic Ash Conveyor, 36" x 24" Jeffrey Flex-Tooth Coal Crusher.
1—705 HP Stirling 4 dum BOILER with B&W U-type superheater.
1—10,000 KW Allis-Chalmers STEAM TURBINE.
1—7,500 KW Allis-Chalmers STEAM TURBINE.
1—7,500 KW General Electric STEAM TURBINE.

All with complete control equipment.
Send for complete Inventory in Denver.

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3—600 KW 750 KVA Diesel Electric Generator Sets (2—Ingersoll-Rand and 1—General Motors).

For further information address
SILAS MASON COMPANY
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FOR
IMMEDIATE SHIPMENT
UNIT CAPACITIES—10 TO 1875 KVA
A.C.—50 AND 60 CYCLES
VARIOUS VOLTAGES

A PARTIAL LISTING OF OUR INVENTORY

KVA	Make	Model	HP	RPM	KVA	Make	Model	HP	RPM
1875	Fairbanks Morse	32F16	2000	300	375	Enterprise	DSC-6	450	450
1420	Fairbanks Morse	38D8 ¼	1600	720	330	Superior	RNA	396	514
1250	General Motors	16-278A	1600	720	312	General Motors	8-268A	450	1200
937.5	General Motors	12-567	1080	720	312	Clark	MD-4	375	327
625	Alco	6-12¾x12T	750	600	125	Ingersoll Rand	S	225	514
425	Baldwin	VO-6	510	450	187	General Motors	8-268A	150	1200
400	Buckeye	80	480	600	75	General Motors	6045C	90	1200

D.C. UNITS ALSO AVAILABLE

A. G. SCHOONMAKER COMPANY, INC.
ENGINE DIVISION, 50 CHURCH ST., NEW YORK 7, N. Y.

FROM AVAILABLE STOCK

TURBO GENERATORS

Qu	KW	Make	Desc.
1	—6000	Al. Ch.	Condensing 200/250 I.S.P. 2300 v. 3/60 Exc. & Surface Cond.
2	—750	G.E.	Condensing — 425 lbs. 750 TT. I.S.P. 440v. 3 ph. 60 cy.— Built 1944
1	—400	Westg.	Non-condensing — 125/150 lbs. I.S.P. 5/10 lbs. B.P.—240/480 v. 3 ph. 60 cy.
1	—300	G.E.	Non-condensing 150/175 I.S.P. 5/10 B.P.—480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

	KVA	Make	Type	Volts	Speed
1	—5140	Whse.		2400/4150	600
1	—3000	Whse.		2400/4800	720

MOTOR GENERATOR SETS
3 ph. 60 cy.

Qu	KW	Make	Speed	DC Volts	AC Volts
2	—2000	G.E.	500	666 25 cy.	11000
1	—1800	G.E.	600	125/250	2300/4150
1	—1500	G.E.	360	275	2200/4400
1	—1000	Whse.	900	600	4150
1	—1000	G.E.	900	600	2300/4150
1	— 750	G.E.	900	275	4150
1	— 750	Whse.	900	275	2300/4150
1	— 600	Whse.	900	250	440
1	— 500	G.E.	720	125	2300
1	— 400	G.E.	720	250	440/2300
1	— 350	G.E.	900	125	4150

TRANSFORMERS—60 Cycle

	KVA	Make	Type	Ph	Voltages
2	—4000	G.E.	HT	3	22000x2300
2	—1250	G.E.	HVDDJ	1	6600x550
4	— 500	G.E.	HDD	1	22850/13200x480
4	— 333	G.E.	HKDD	1	13800/7900x230/460
6	— 300	G.E.	HT	3	2400x240/480
8	— 300	G.E.	HT	3	13800x240/480

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We carry a large stock of transformers, and invite your inquiries.

PIONEER TRANSFORMER REBUILDERS
We rewind, repair and redesign all makes and sizes. *One Year Guarantee.*

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
SINCE 1912 CINCINNATI 27, OHIO

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ELECTRICAL ENGINEERS & EQUIPMENT

TRANSFORMERS
1—1500 KVA G.E., 3 Ph., 4150V, 2300V Pyranol
1— 500 KVA Kuhl, 1 Ph., 4150V to 2300V.
3— 400 KVA G.E., 1 Ph., 6900V, 2300V Sec.
1— 200 KVA G.E., 3 Ph., 2400V 220 Sec.
1— 150 KVA G.E., 3 Ph., 4150V 120/208Y
2— 50 KVA G.E., 1 Ph., 13,460V, 120/240V Sec.
6— 25 KVA G.E., 1 Ph., 44B/220, 220/110 Sec.

SYNCHRONOUS MOTORS
1— 300 H.P. Electric Machinery, 3 Phase, 2200V., Total Enclosed and Cooled Outdoor Service.

MOTOR GENERATOR SETS
1—1000 KW G.E., 600 V, 514 RPM, 4000V Syn.
1— 175 KVA West., 1 Ph. 220V, Motor 3 Ph. 440V
1— 150 KW G.E., 125/250V, 1200 RPM, 2300 Syn.
1— 100 KW El. Mchy. 125V, 1200 RPM 4150V Syn.
2— 40 KW El. Mchy., 125V, 1200 RPM, 440 D.C.

SLIP RING MOTORS
1—2500 HP G.E., WT, 257 RPM, 6600V
1— 250 HP West., CW, 600 RPM, 440V

SYNCHRONOUS CONDENSER
1—2500 KVA Whse., 720 RPM, 2200V with D.C. Exc.

Large Stock of A.C. and D.C. Equipment

LETTERS TO THE EDITOR

Last Bumper Crop?

To the Editor:

I want to congratulate you for the very excellent editorial "The Last Bumper Crop—Lost?" You make an excellent point that the utilities must get out and recruit and tell their story if they are to attract engineers. Then as we turn the page we find two more editorials which answer the rest of the problem:

(1) You point out that utilities have not put the touch of glamour on power engineering that would lead to recognition of the work of young engineers such as the Eta Kappa Nu award.

(2) You point out that many engineers are doing minor jobs, and the implication is that this may further detract from the attractiveness of engineering employment in the utilities.

The only thing you missed is that you should have put a note at the bottom of the lead editorial saying "Turn the page to get the rest of the story."

You might also point out that "Electrical World" recognized this problem exactly four years ago and tried to call the utilities' attention to it in a survey report in the May 10, 1947 issue . . .

F. E. Sanford
Commonwealth Services, Inc.
Jackson, Michigan

A Risky Calculation

To the Editor:

On page 79 of the March 12 edition of "Electrical World" you state "Chapman said the region has had median or better water in 20 of the past 26 years"; then you quote him "I am justified in assuming a calculated risk on power supply in the Pacific Northwest . . . based on power supplies available during the next few years under median-year water conditions."

I sincerely hope that no other defense agency is jeopardizing the security of our country by assuming calculated risks on such careless reasoning. Assuming that a 50-year median for the area covering the period 1901 to 1950 inclusive is being used, then the 26-year period referred to would be from 1925 to 1950 inclusive. If 20 of these years were above the median and 6 below, it follows that during the 24-year period 1901 to 1924 inclusive, only 5 could have been above median and 19 had to be below. Based on these assumptions, the most optimistic calculated risk covering the immediate future is that half of the years will be below median and half above.

H. W. Oetinger

404 Poplar Apts
Charlotte 6, N. C.

Let the Fish Live

To the Editor:

The editorial in your May 7 issue headed "Let Tacoma Build Its Cowlitz Project" was disturbing. It appeared to be based at least in part on misinformation, and failed to consider several important factors:

1. At a meeting of the Interior Department Advisory Committee on Conservation, we were informed by Director Day of the U. S. Fish and Wildlife Service that the Tacoma engineers' proposed plan for safeguarding the valuable fishery of Cowlitz river has little likelihood of operating successfully.

2. The state of Washington unequivocably stated its position against the dams through a legislative act two years ago forbidding them, and recently by refusing to repeal the law.

3. The Cowlitz is perhaps the key stream in the $20,000,000 (authorized) federal program for stabilizing and perpetuating the commercial and recreational fishery of the lower Columbia basin. The Cowlitz is the one important stream in the lower basin that is still free of obstructions impassable to salmon, and Director Day informed us that it contains about 50% of the spawning areas available in the lower basin.

4. Enough damage will be done by other proposed main stem dam construction to justify keeping the Cowlitz forever clear of obstructions. Some 15% of your salmon and steelhead spawned upstream are lost passing through the turbines of Bonneville trying to reach the sea. If the 15% loss rate is approximately correct—and we believe it is—the seven present and planned dams would virtually wipe out the salmon from Bonneville upstream except for a few stragglers.

5. We won't quibble over legitimate and needed national defense measures. At the same time, the conservation forces of the country are not going to stand for the trumpeting of a lot of false or misleading "national defense" propaganda as justification for the wiping out of self-renewing resources needed throughout our life as a nation.

We would far rather cooperate with the world of electrical power than enter into controversy with it, but we refuse to concede that any resource, industry, or important segment of the public must give way or be ground to bits like the small salmon at Bonneville.

William Voight, Jr.
Executive Director
Izaak Walton League of America, Inc.
31 N. State Street
Chicago 2, Illinois

Individual Management

To the Editor:

In reading Lee Wilcoxon's letter "Co-op Didn't Cooperate" in your May 7, 1951 issue, I think he should censure the person he is dealing with or the Co-op. The Rural Electrification Administration is a large organization and there are many co-ops using this program.

We all should know what would make a co-op good or bad is the person that is behind the management. What I want to get over to your readers is not to be critical of all R.E.A. Co-ops, but look at each one when we criticize them.

Robert W. Williams, Jr.
Engineer
Oconee Electric Co-op
Dudley, Georgia

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THE

"MK-40"

The Standard of Comparison

Universal acceptance by operating engineers is abundant proof of the sound engineering principle incorporated in the design.

Its simplified construction and improved high pressure contacts at both ends of the blade insure the highest mechanical and electrical performance under the most severe weather and service conditions.

You can select a Delta-Star group-operated "MK-40" switch for every type of service, from 7.5 thru 230-kv and current ratings to 5000 amperes.

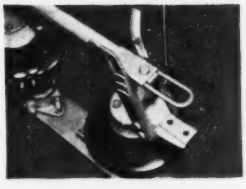
Delta-Star 69-kv. 600 amp. "MK-40" air switch

CURRENT PATH

From terminal to terminal the number of current interchange surfaces is reduced to an absolute minimum. Both ends of the floating tubular blade have the same type of reliable high pressure contacts backed by independent pressure applying members. There are no other moving contact surfaces or springs. Everything is in plain view for visual inspection.

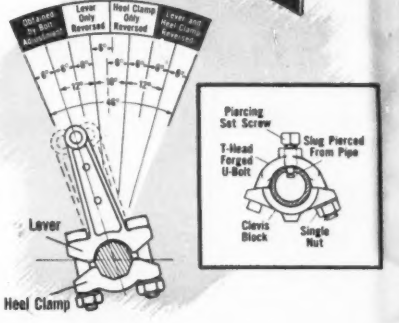
BLADE MECHANISM

Fully controlled blade is actuated by a 45-degree bearing mechanism which replaces cranks, levers, links and cams. It converts motion of operating insulator to a vertical lifting and rotating motion of the blade, with a smooth sequence and just the right mechanical advantage. Blade locks automatically in both opened and closed positions.



CONTACTS

Current carrying function of the contacts is independent of the pressure applying members to take full advantage of the electrical and mechanical characteristics of the materials used. Hard drawn copper shoes have heavy silver inlays. Ample material for heat dissipation assures high thermal conductivity. Uniform contact pressure is maintained by long, beryllium copper springs which carry no current.



OPERATING MECHANISM

Switch and control bearings have greaseless non-rusting ball bearings—insure free operation under all weather conditions. Self-piercing set screws on clamp type U-bolt fittings eliminate threading and drilling of pipe. Completely adjustable lever can be installed or removed without disturbing rotating insulator.

WHEN YOU WANT THE BEST IN HIGH VOLTAGE SWITCHES SPECIFY THE "MK-40"

DELTA-STAR ELECTRIC COMPANY

DIVISION OF H. K. PORTER COMPANY, INC.

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DISTRICT OFFICES IN PRINCIPAL CITIES

Above: Shown are four of the five big turbines of the Colorado Springs Municipal Utilities. NONPAREIL Turbine Oil helped operators "wash their hands" of oil-system maintenance troubles.

Left: J. J. Tyler (left), Standard Oil lubrication specialist, and W. J. Whelan, plant engineer, discuss the written guarantee given with each fill of NONPAREIL Turbine Oil.

Washed their hands of turbine-lubrication trouble!

NONPAREIL
TRADE MARK
Turbine Oil

Operators of the Colorado Springs Municipal Utilities had their hands full keeping oil systems clean in three big turbines. At least once a year, sludge and varnish had to be removed from the lubricating systems. Moreover, gradual deterioration of the lubricant used in the turbines made it necessary to replace fills of oil approximately every three years.

The recommendation of a Standard Oil lubrication specialist changed all of that. Operators took his advice and switched their turbines to NONPAREIL Turbine Oil.

Throughout ten years of operation, oil systems have stayed clean. The original fills of NONPAREIL have shown no appreciable deterioration, and neutralization numbers have remained below 0.10 KOH/gm. As a result, no fill of oil has needed to be replaced. The men of the Colorado Springs Municipal Utilities report: trouble-free lubrication by NONPAREIL has pared lubrication and maintenance costs to the bone! Since the switch to NONPAREIL, two new turbines have been added. Both of these units are lubricated with NONPAREIL Turbine Oil.

Trouble-free, low-cost lubrication is assured the Colorado Springs Municipal Utilities not only for 10 or 15 or 20 years but for the life of their turbines. This assurance is based on a written guarantee, given with each fill of oil to all NONPAREIL users, that NONPAREIL Turbine Oil will maintain a neutralization number below 0.15 KOH/gm. for the life of the turbine it lubricates. NONPAREIL has borne out its guarantee by having served, in individual turbines, for as long as 22 years without once being removed or replaced.

Ask a Standard Oil lubrication specialist to show you actual case histories from utility plants where NONPAREIL has reduced lubrication costs as much as 65%. You can reach a lubrication specialist by phoning your local Standard Oil Company (Indiana) office. Or, write:

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

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